

Aristotle's

DE MOTU ANIMALIUM

*

Text with Translation, Commentary,
and Interpretive Essays by

MARTHA CRAVEN NUSSBAUM

PRINCETON UNIVERSITY PRESS
PRINCETON

Published by Princeton University Press, 41 William Street,
Princeton, New Jersey 08540
In the United Kingdom: Princeton University Press, Chichester, West Sussex
Copyright © 1978 by Princeton University Press

All Rights Reserved

Library of Congress Cataloging in Publication Data will be
found on the last printed page of this book

First Princeton Paperback printing, with corrections, 1985

LCC 77-72132

ISBN 0-691-07724-8

ISBN 0-691-02035-3 (pb.)

Publication of this book has been aided by a grant from
The Andrew W. Mellon Foundation

Princeton University Press books are printed on acid-free paper
and meet the guidelines for permanence and durability of the
Committee on Production Guidelines for Book Longevity of the
Council on Library Resources

Printed in the United States of America

9 8 7 6 5 4

To the memory of my father, George Craven, 1901-1972

CONTENTS

ACKNOWLEDGMENTS	ix
ABBREVIATIONS USED FOR WORKS OF ARISTOTLE	xi
ABBREVIATIONS USED FOR JOURNALS AND REFERENCE WORKS	xii
INTRODUCTION	xv
NOTE TO THE PAPERBACK EDITION	xxv
 I AUTHENTICITY, TEXT TRANSMISSION, AND MANUSCRIPTS	 1
Chapter 1. The Authorship and Dating of the <i>De Motu Animalium</i>	3
Chapter 2. The Manuscripts	13
II TEXT AND TRANSLATION	19
Note on the Translation	20
Text	25
Translation	24
III INTERPRETIVE ESSAYS	57
Essay 1: Aristotle on Teleological Explanation	59
The Democritean Challenge	61
The Level of Explanation: Form and Matter	67
Teleology: The Direction of Explanation	74
Self-Maintaining Systems	76
Functions	81
Teleology and Intentionality	85
Teleology and Necessity	88
Teleology and the Universe	93
Appendix: The Function of Man	100
Essay 2: The <i>De Motu Animalium</i> and Aristotle's Scientific Method	107
The <i>MA</i> and <i>Physics</i> VIII	114
Animal Motion and Heavenly Motion	121
Chapters 1 and 2: introductory remarks on animals	121
Chapters 3 and 4: the arguments for an external unmoved mover	125
Essay 3: The <i>Sumphuton Pneuma</i> and the <i>De Motu Animalium</i> 's Account of Soul and Body	143
The <i>pneuma</i> and hylomorphism	146
The <i>pneuma</i> and Aristotle's theory of matter	158

CONTENTS

Essay 4: Practical Syllogisms and Practical Science	165
Necessity and the Practical-Theoretical Parallel	175
The Practical Syllogism in the <i>De Motu</i>	184
The Syllogism in <i>EN</i> VII and <i>DA</i> III	201
Rules and Practical Consistency	210
Essay 5: The Role of <i>Phantasia</i> in Aristotle's Explanations of Action	221
<i>Phantasia</i> in the accounts of action	232
The use and range of <i>phantasia</i>	241
<i>Phantasia</i> and <i>aisthēsis</i>	255
<i>Phantasia</i> and <i>orexis</i>	261
<i>Phantasia</i> and thinking	265
IV COMMENTARY	271
Chapter 1	273
Chapter 2	286
Chapter 3	292
Chapter 4	311
Chapter 5	325
Chapter 6	331
Chapter 7	341
Chapter 8	353
Chapter 9	369
Chapter 10	374
Chapter 11	379
BIBLIOGRAPHY	387
INDEX	401
INDEX OF PROPER NAMES	406
INDEX LOCORUM	412

ACKNOWLEDGMENTS

This book could not have been written without the Society of Fellows at Harvard, which supported me generously during its preparation and made it possible for me to spend a year in England, during which much of the work was completed.

Aristotle wrote of philosophical studies that "it is not easy to be continuously active in solitude; but with others and towards others it is easier" (*EN* 1170^a5-7). This book owes an enormous debt to those whose philosophical acumen and whose friendship inspired and encouraged me through many drafts. My first thanks are due to G. E. L. Owen, who suggested this as a thesis topic and supported me through every stage in my work. His dedication, his boundless energy, and his incisive intellect are a model for me, as they are for everyone working in this field. To Terence Irwin, my second thesis reader, I am grateful for a detachment and a lucidity that repeatedly engendered productive dissatisfaction with current progress. My understanding of various problems connected with practical reasoning and the practical syllogism owes much to conversations and correspondence with David Wiggins; the whole book owes more still to his insight, encouragement, and friendship. Conversations with Nelson Goodman and Thomas Nagel were invaluable for my revisions of what is now Essay 5. In Albert Henrichs, the text and many portions of the commentary found a critic both diligent and acute. Gerasimos Santas and Marianne McDonald read the entire manuscript with great care and made a number of valuable suggestions. During the final stages of revision I was stimulated by conversations with Hilary Putnam and John Rawls, by forceful criticisms from Zeph Stewart, and by questions from Bruce Altshuler and the students in my Philosophy 105. I particularly wish to thank Norman Malcolm for giving me per-

ACKNOWLEDGMENTS

mission to discuss a forthcoming article of his in Essay 4.

There are many others whose contributions have been valuable to me, and I hope they will forgive this list, a totally inadequate gesture of appreciation: J. L. Ackrill, D. M. Balme, J. Cooper, D. J. Furley, R. Kassel, C. Kirwan, A. C. Lloyd, Paul Moraux, Malcolm Schofield, Peter M. Smith, Richard Sorabji, Bernard Williams.

Translations from the Greek (including the Homer translation in Essay 1) are my own, unless otherwise acknowledged.

Martha Craven Nussbaum

ABBREVIATIONS USED FOR WORKS OF ARISTOTLE

		<i>Bekker nos.</i>
<i>Cat.</i>	<i>Categories</i>	1-15
<i>DI</i>	<i>De Interpretatione</i>	16-24
<i>APr</i>	<i>Prior Analytics</i>	24-70
<i>APo</i>	<i>Posterior Analytics</i>	71-100
<i>Top.</i>	<i>Topics</i>	100-164
<i>SE</i>	<i>De Sophisticis Elenchis</i>	164-184
<i>Pb.</i>	<i>Physics</i>	184-267
<i>DC</i>	<i>De Caelo</i>	268-313
<i>GC</i>	<i>De Generatione et Corruptione</i>	314-338
<i>Meteor.</i>	<i>Meteorologica</i>	338-390
<i>DA</i>	<i>De Anima</i>	402-435
<i>PN</i>	<i>Parva Naturalia</i>	436-486
<i>Sens.</i>	<i>De Sensu</i>	436-449
<i>Mem.</i>	<i>De Memoria</i>	449-453
<i>Somn.</i>	<i>De Somno</i>	453-458
<i>Insomn.</i>	<i>De Insomniis</i>	458-462
<i>Div. Somn.</i>	<i>De Divinatione per Somnum</i>	462-464
<i>Long.</i>	<i>De Longitudine Vitae</i>	464-467
<i>Juv.</i>	<i>De Juventute</i>	467-470
<i>Resp.</i>	<i>De Respiratione</i>	470-480
<i>HA</i>	<i>Historia Animalium</i>	486-638
<i>PA</i>	<i>De Partibus Animalium</i>	639-697
<i>MA</i>	<i>De Motu Animalium</i>	698-704
<i>IA</i>	<i>De Incessu Animalium</i>	704-714
<i>GA</i>	<i>De Generatione Animalium</i>	715-789
<i>Probl.</i>	<i>Problemata</i>	859-967
<i>Metaph.</i>	<i>Metaphysics</i>	980-1093
<i>EN</i>	<i>Nicomachean Ethics</i>	1094-1181
<i>MM</i>	<i>Magna Moralia</i>	1181-1213
<i>EE</i>	<i>Eudemian Ethics</i>	1214-1249
<i>Pol.</i>	<i>Politics</i>	1252-1342
<i>Rhet.</i>	<i>Rhetoric</i>	1354-1420
<i>Po.</i>	<i>Poetics</i>	1447-1462

ABBREVIATIONS USED FOR JOURNALS AND
REFERENCE WORKS

<i>AbbBerl, AbbMainz</i>	<i>Abhandlungen of Berlin and Mainz Academies</i>
AGP	<i>Archiv für die Geschichte der Philosophie</i>
AJP	<i>American Journal of Philology</i>
<i>AntCl</i>	<i>L'Antiquité classique</i>
APQ	<i>American Philosophical Quarterly</i>
BJP	<i>British Journal of Psychology</i>
BJPS	<i>British Journal of the Philosophy of Science</i>
CAG	<i>Commentaria in Aristotelem Graeca</i>
ClMed	<i>Classica et Mediaevalia</i>
CQ	<i>Classical Quarterly</i>
CR	<i>Classical Review</i>
HSCP	<i>Harvard Studies in Classical Philology</i>
JHB	<i>Journal of the History of Biology</i>
JHS	<i>Journal of Hellenic Studies</i>
JOBG	<i>Jahrbuch der österreichischen byzantinischen Gesellschaft</i>
JPhilol	<i>Journal of Philology</i>
JPhilos	<i>Journal of Philosophy</i>
<i>MusHelv</i>	<i>Museum Helveticum</i>
PAS	<i>Proceedings of the Aristotelian Society</i>
PASS	<i>Proceedings of the Aristotelian Society, Supplementary Vol.</i>
PBA	<i>Proceedings of the British Academy</i>
PCPS	<i>Proceedings of the Cambridge Philological Society</i>
PPA	<i>Philosophy and Public Affairs</i>
PQ	<i>Philosophical Quarterly</i>
PR	<i>Philosophical Review</i>
PS	<i>Philosophy of Science</i>
RE	<i>Pauly-Wissowa, Real-Encyclopädie der klassischen Altertumswissenschaft</i>
REG	<i>Revue des Études grecques</i>
RM	<i>Review of Metaphysics</i>

ABBREVIATIONS

RPh	<i>Revue de philologie, de littérature, et d'histoire anciennes</i>
ZDMG	<i>Zeitschrift der deutschen morgenländischen Gesellschaft</i>
ZOG	<i>Zeitschrift für die österreichischen Gymnasien</i>

INTRODUCTION

"The unexplained should by all means be inexplicable, the unexplainable by all means unnatural, supernatural, miraculous—thus goes the demand in the souls of all the religious and the metaphysicians . . . ; while the scientific person sees in this demand the 'evil principle'."

Friedrich Nietzsche, *Human, All-Too-Human*, 136

I

The aim of this book is to ask through a study of one of his most complicated treatises on explanation, how far, and in what sense, the demands of the "scientific person" are Aristotle's. All men by nature reach out for understanding (*Metaph.* 980^a1). What form does this *epistēmē* take, and how far, in the various areas of human life and study, can our need for it be satisfied? What will the most satisfactory answers to our "why" questions be like? How are our various answers related? How far should we press the demand for understanding?

These are, of course, the central preoccupations of Aristotle's philosophical work; no comprehensive account could be attempted here. But the *De Motu Animalium*, with its cryptic and intricate attempt to formulate answers to some of these questions, provides us with an occasion to make some preliminary moves toward such an account, while at the same offering a comprehensive exegesis of a little-known source of evidence. Aristotle's treatment of these central problems is never dogmatic. One of the great virtues that distinguishes him from his philosophical predecessors is his reluctance to press for a single answer when the evidence points to several, or to apply incautiously in one area a solution that had been found promising in another. The best way to build towards an account of his theories seems, then,

to be to begin with particular problems, or with the data of a particular text, "through which we may seek the general account as well, and with which we think it ought to be in harmony" (cf. *MA* 698^a13-14). As Aristotle's treatises are related to our experience of and talk about the world, so it is the aim of this commentary to stand to one of his works: as a sorting-out and an interpretation that both "saves" the "appearances" and illuminates them.

Aristotle was the first philosopher to cherish books and reading. He believed that all genuine philosophy is commentary—on the texts of the "wise" and on the data of our ordinary speech.¹ Throughout his career, he defended commentary against the claims of those who insisted that the philosopher ought to seek a mystical revelation that would set him apart from the common man, and teach a self-contained doctrine that would make no attempt to return to the "appearances," to the world in which we live our daily lives.² It seems particularly fitting, then, that one who thinks Aristotle one of the very wisest of "the many and the wise"³ should embrace the philosophical task that he invented—and as one which can contribute not only to our understanding of Aristotle but, ultimately, to our grasp of the questions that this wise man thought most important. If it was with a sneer that Plato invited students occupied with higher matters to pay a visit to "the reader's house" (*Vita Marciana* 5), we might answer the sneer with the "reader's" reported epigram: "As sight receives light from the surrounding air, so does the soul from its studies"

¹ On the Aristotelian notion of the "appearances" (*phainomena*), cf. Essays 2 and 5. I am indebted throughout to Owen's important "*Tūthenai*," which first made the vital point that the *phainomena* include what we say, as well as what we see and hear.

² Cf. *DC* 293^a27-30, 306^a5 ff.; *GC* 316^a5-14, 325^a13 ff.; and notes to chapter 1, 698^a4 ff. Dialectic may, of course, require us to abandon or alter some of our initial beliefs (*Top.* 101^a33, *EN* 1145^b2-6); but if the argument is not merely eristic (cf. 160^a33 ff.), it will show that our most basic beliefs and sayings require the change.

³ *Top.* 100^b21, 104^a8-10.

(*Diog. Laert.* §17). *Mathēmata*, the texts of distinguished books and of common experience, here take the place of Plato's mystical vision of the Forms as our best (and only) source of philosophical light. Aristotle insists that we must confront great obscurities not with a prayer for sudden insight, but by "trying to say the *phainomenon*"—by setting out clearly what we and others say; the student who has a genuine thirst for philosophy will consider it a sign of self-respect to attempt neither more nor less than this.⁴ I shall try here to describe an Aristotelian text as it appears to me, and to show how it might be a source of learning. My ideal would be to treat Aristotle with the critical rigor, the independence, and the devotion⁵ with which he treated those who helped him to understand the world.

II

We see animals moving around—walking, swimming, flying, creeping. And we ourselves are also moving animals. Why? What role does motion from place to place play in animal lives? And what would be an adequate explanation of a particular animal movement? Is there some general account we can give of these phenomena that will hold good for humans and animals alike? With these questions, and with the hope that such a general answer will be found, Aristotle begins the *De Motu Animalium*.

If the work assumes anything from the beginning, it is that it always makes sense to ask the question "Why?" about a particular case of animal motion. This is not a trivial claim.

⁴ *DC* 291^b25-28; this passage is discussed further in Essay 2, and especially in n. 47, which defends the reading here adopted.

⁵ Aristotle (if it was, indeed, he) wrote that Plato was a man "whom it is not right for base men *even* to praise" (*Olympiodorus In Pl. Gorg.* 41.3, emphasis mine)—thus succinctly indicating that the independent critic can be more truly reverent than the disciple. Many attacks on Aristotle's reputation as a historian of philosophy neglect this point.

To see this, let us imagine that two Greek biologists are conversing—somewhere in Asia Minor, by the side of a large fresh-water pond.

B.: Why did that tortoise cross the mud? (cf. *MA* 698^b16)

A.: To get to the other side.

B.: (triumphantly) Wrong.

A.: Well, what was the reason then?

B.: No reason at all.

A.: What do you mean? Didn't he go to get something? Wasn't there something he wanted, something he couldn't get without crossing the mud?

B.: No. You can see that there's nothing over there but more mud.

A.: Well maybe he is running away from something. If his feet weren't slipping so much (cf. *MA* 698^b17), he would be going rather fast. The origin of motion can be an object either of pursuit or of avoidance (cf. 701^b33–34).

B.: No, there is *no* reason. On your instructions I have been sitting beside this pond studying these tortoises every day for three years now. So you had better write in your *Historia Animalium* that they have been known to move for no reason.

A.: I see. You mean that there isn't any ordinary teleological account in terms of the tortoise's goals and desires. As part of your research you've planted some mechanical device in his heart that simply triggers the motor activity.

B.: You are trying to substitute one sort of explanation for another. I am saying something entirely different: there just *is* no explanation.

A.: (turning to go) Well, send a messenger to me when you find it, and then we can get together and finish those chapters.

B.: You are deliberately misunderstanding me. You are looking for excuses to abuse my professional standing.

I am not saying that I do not *know* the explanation; I am saying that I know that there *is no* explanation. Animals, especially tortoises, are arbitrary creatures. There are some cases (though not terribly many) where they move this way or that, jump in the air or cross the mud, for no reason at all. It is a mistake to suppose that all cases can be forced into your pattern; some are simply intractable, and any good theory of animal motion must acknowledge this. To say that all motions can be—even potentially—understood and explained is just a fashionable dogmatism.

B.'s position is not at all absurd or indefensible⁶—though there is, of course, danger in retreating to such a position too soon in any particular problem case. We will want to be very sure that he has not simply overlooked some relevant piece of evidence, or failed to develop the best kind of explanatory theory. It is not through researchers like B. that science has progressed. Still, we seem to have no way of refuting him *in general*. Even if he does accept as adequate many explanations we now use, for example those that allow us to make consistently successful predictions, it is hard to imagine that there will never be a piece of recalcitrant evidence he can use against us. And even if he does not see any, he may insist on holding it open as a conceptual possibility that there might be. He will tell us that it is simply a prejudice, connected with our modern optimism for science, that every motion can be explained and that nothing is random or arbitrary.

It is from the conviction that B. is wrong about the explanation of particular animal motions—or, at the very least, from the decision that the only sensible thing for the scientist to do is to force him to cede as much ground as

⁶ A form of it has been defended by von Wright in *EU* and a subtler and more moderate related position is defended by Malcolm in "Intention and Behavior". Both of these, and Aristotle's view, are discussed at length in Essay 4.

possible, that Aristotle begins the *MA*. I am inclined to think that he would find B.'s position not just pragmatically unsound, but more than that: a failure to comprehend the *meaning* of our notions of action and motion. B., one might argue, is not even speaking our language when he talks of an inexplicable motion, or a random action.⁷ *Tuchē*, chance, is not a separate explanatory principle; all motions described as coming about "by chance" have, under some description, an adequate explanation. If Aristotle's vaunted optimism for science means anything (and it does not mean everything it has been taken to mean—cf. Essays 2 and 4) it does mean that it is always appropriate to ask, "Why this motion?," and to search persistently for the most adequate response.

Aristotle realizes, of course, that there are a number of ways this question might be answered. A main aim of the treatise will be to analyze and defend a certain kind of answer—the teleological—and to indicate its relationship to other answers. In the process, Aristotle presents an analysis of motivation that has important implications for our understanding of his theory of soul and his account of human deliberation. And the treatise addresses itself to cosmological questions as well: the conditions for motion in the universe, the necessity of postulating an unmoved mover. We discover in some cases that its unusual combination of questions has suggested to Aristotle more adequate solutions for problems he had approached separately in other works.

III

The *MA* is cryptic and brief, occasionally obscure.⁸ Because of its heterogeneity, it has often been studied piece-

⁷ Cf. Essay 4.

⁸ The only full-length commentaries ever written on the *MA* (to my knowledge) are the twelfth-century commentary by Michael of Ephesos and the thirteenth-century treatise *De Principiis Motus Progressivi* of Albertus Magnus. Short paraphrases were written by a number of mediaeval philosophers, among which those of Buridan

meal for the light it could shed on the discussion of similar questions in the ethical and cosmological works. But it is from a study of its entire plan and argument, rather than from considering it bit by bit, that one can emerge with the most useful insights into the many problems with which it deals. Because it is so full of allusions to other Aristotelian works, it cannot be interpreted without extensive analysis of parallel discussions and an attempt to see the problem in question as it emerges from Aristotle's work as a whole. The framework of line-by-line commentary proves, in consequence, too confining. One has to take a stand on some major issues in Aristotle's philosophy of science, ethics, and philosophy of mind before one can claim to have interpreted the *MA*. The aim of the interpretive essays is to provide this kind of wide-ranging discussion of central problems, while leaving for notes textual, historical, and less central exegetical points. Sometimes the division may appear arbitrary: a point of some philosophical importance may find itself in the notes because it simply did not help the argument of any of the essays, or a rather technical piece of exegesis may be found in an essay because it is crucial to its argument. I have tried to make cross-references as extensive as possible, in order to minimize this problem for the reader. But I hope that this format will make my views on major issues as accessible as possible to the reader with no knowledge of Greek (none of the essays uses untranslated Greek), and to those interested less in the *MA* itself than in Aristotle's position on certain central problems in philosophy.

The first essay provides a general introductory account of Aristotle's views on functional and teleological explanation and, in an appendix, an analysis of the famous "man's

and Burley have recently been edited, and are occasionally useful. (On all these, see the full discussions in my doctoral thesis, Part I, chapter 2.) Among modern exegeses, most valuable are Farquharson's notes to his Oxford Translation. Notes are also provided by Torraca and Louis, and summaries of the argument can be found in Jaeger, "Pneuma," and Düring, *Aristoteles*, 345.

function" argument from the *Nicomachean Ethics*. It is an introduction to the teleological arguments of the *MA* itself and has little to say directly about the treatise. The second is largely devoted to some difficult exegetical questions in the *MA* and to some larger problems they raise for an understanding of Aristotle's philosophy of science. The aim is to explain the *MA*'s odd blend of biological and cosmological argument, showing what questions it intends to answer and how it represents a modification of some earlier views about the interrelationships of the natural sciences. The third gives a general account of the *MA*'s picture of the soul-body relation and attempts, using this as a basis, to resolve the treatise's most difficult exegetical dilemma, the problem of the *sumphuton pneuma*, or innate breath. The fourth essay asks whether Aristotle believed that ethics could be made a deductive science and whether this is a good aim for the moral philosopher to have. Aristotle's use of parallels between practical and theoretical reasoning, and his theory of the practical syllogism (particularly in its *MA* form) are examined for the light they can shed on Aristotle's answers to these questions. The fifth essay, though less closely tied to the treatise itself than the others, proved necessary in order to provide an account, lacking in the literature, of the special role played by *phantasia* in the accounts of action in the *MA* and in *De Anima* III. Work on the problem opened up some issues of great interest for the proper assessment of his epistemology. The essay criticizes some standard empiricist notions about imagination, both on philosophical grounds and as readings of Aristotle, and argues that Aristotle gives us a more plausible and subtle account.

It will be apparent that the essays vary a good deal both in the amount of general philosophical argument they include and in the proportion of text devoted to direct exegesis of the *MA*. Essays 1, 4, and 5 will be of most interest to the general philosophical reader; of these, 1 and 5 contain little bearing directly on the *MA*'s argument. Essays 2 and 3 are more tightly linked to the treatise. The chapter

notes attempt, in introductory paragraphs, to provide a general outline of the course of Aristotle's argument; both these summaries and the notes themselves should always be consulted in connection with the essays for supplementary material.

Originally I had not intended to produce an entirely new critical edition of the *MA* text. But my examination of the tradition convinced me that this was necessary. Previous editors had made and transmitted numerous errors in collation and had failed to examine some manuscripts of interest. A fully satisfactory analysis of the MS families had not been presented, and many difficult textual problems had received insufficient attention. My extensive work on the manuscripts and the text is described in my article, "The Text of Aristotle's *De Motu Animalium*," which also includes some lengthy sections of commentary on the passages of the treatise that are most perplexing from a textual viewpoint.⁹ I plan to give here only a very brief summary of my findings about the manuscripts and, in the commentary, to recapitulate in a very economical way the philological material presented in that article. Readers who want a more comprehensive defence of emendations and selections must be referred there; but I shall omit nothing that is central to an appreciation of Aristotle's argument and shall always indicate clearly where such condensation has occurred.

The *MA* was, until recently, held by many not to be genuine work of Aristotle. Since I shall in the body of this work assume its authenticity, I shall begin with a brief account of this debate.

⁹ See commentary *ad loc.* for specific references.

For this reprinting I have confined myself to the correction of errata and the addition of marginal reference numbers in the Commentary section. This unpardonable omission in the original printing was justly castigated by reviewers. I apologize for the difficulty caused in locating references, and I can only say in mitigation that I myself have by now experienced the difficulty as often as anyone. I am very grateful to Allan Gotthelf for his invaluable help in detecting errata; I am entirely responsible, of course, for those that remain.

The most welcome result of publishing an edition of a neglected work that one loves is the consequent increase in volume and quality of discussion of the work. I have been pleased and edified by the discussions that this edition has helped to occasion. It seems to me splendid, as well as quite just, that the *De Motu* should now be acclaimed as "one of the brightest jewels of the corpus" (M. F. Burnyeat). And it looks brighter than ever thanks to the close attention of many fine philosophers and scholars. At the end of this Preface I include a short annotated bibliography, mentioning longer reviews and related philosophical articles that seem to me to make a valuable addition to our understanding of the text. I have here for the most part confined myself to work directly on *De Motu* and have not attempted to review the state of debate on the problems discussed in the Essays. Even here I do not aim at completeness; I am certain that I have omitted many valuable items. I omit, besides, all reviews that do not undertake to advance and defend some original view of the text.

It is pleasant to be able to say that the question of the authenticity of the *De Motu* has been laid to rest, for the time being at least. In 1981, the Ninth Symposium Aristotelicum took up the question of the authenticity of dubious Aristotelian works. The *De Motu* was on the original list, and I was asked to defend it. The organizing committee proved unable, however, to find anyone who was willing to argue the other

side of the case; I was therefore asked to prepare a paper on a different topic. Anthony Kenny's general research on Aristotle's style, as presented at the meeting, gave further support to the judgment of authenticity.

To record the development of my views on each of the complicated issues mentioned in this book would be the job of another book, not another preface. And in fact several of the central issues of this book are also discussed in my forthcoming book, *The Fragility of Goodness: Luck and Ethics in Greek Tragedy and Philosophy*, Cambridge University Press, 1985. Aristotle's interest in the "appearances," and the role this plays in his philosophical method, are the subject of chapter 8 of the book, which was originally separately published under the title "Saving Aristotle's Appearances." Chapter 9 discusses the role of desire and belief in the explanation of action; it is, in part, a criticism of material in Essays 1 and 4 of this book, and I shall summarize its results below. A slightly different version of this chapter has been published as "The Common Explanation of Animal Motion." Chapter 10 of the new book gives an account of Aristotelian deliberation and of the role of rules in practical reasoning; it expands and in some respects criticizes Essay 4 of this book. Issues about moral conflict mentioned in Essay 4 are a central theme of the new book as a whole. In addition, the criticism of the Neo-Thomist reading of Aristotle that I here develop in Essay 4 and in the Appendix to Essay 1 is further developed in a separate paper, "Aristotle on Human Nature and the Foundations of Ethics," read to the Florida conference on Aristotle, January 1983, and forthcoming. I therefore refer the reader to these other writings for an account of the ways in which I have been rethinking the problems of the *De Motu*.

One major issue must, however, be mentioned. In this book I ascribe to Aristotle the view that desire and belief have both a logical and a causal connection with action. I criticize this view, saying that the logical connection precludes a genuine causal connection. Whether Aristotle realized this or not, I say, we will have to find items that are conceptually independent of one another before we will have a real causal ex-

planation. I suggest that we might look for these items on the physiological level; and I speculate that Aristotle might be heading in that direction in chapter 7 (cf. esp. 87–88, 188). I now believe that this is unsatisfactory, and that Aristotle's account is considerably stronger than I here say it is. In "The Common Explanation" I articulate and defend, with reference to the *De Motu* and other related texts, the view that only on the psychological (desire/cognition) level can we have an adequate causal explanation of an animal motion; and I argue that there is no reason to take the sort of logical connection that desire and cognition have with action to be an impediment to finding a genuine causal connection. I also add some historical background material about Pre-Socratic and Platonic views on the explanation of animal motion that seems to me to illuminate Aristotle's problem; and I include a thorough study of the background of Aristotle's notion of *orexis*, which I argue to be a significant philosophical innovation. The result seems to me, both philosophically and historically, to go beyond what is in this book on these particular issues.

One more point that has frequently given rise to misunderstanding through deficient emphasis on my part. Argument to the effect that Aristotelian *aisthēsis* is active and selective, rather than merely passive and receptive, should not be taken to tell against my account of *phantasia*. This is so because I begin my account of *phantasia* from Aristotle's claim that the *phantastikon* and the *aisthētikon* are "the same," though "different in being." I argue that *phantasia* is one aspect of *aisthēsis*, broadly construed (234 ff., and esp. 236): "Many of the activities of the *aisthētikon* can also be viewed, in some other way, as activities of the *phantastikon*" (236). I point out that Aristotle does sometimes use '*aisthēsis*' in a narrower way, to refer to the non-active, non-*phantastikon* aspect of the general process: '*aisthēsis*', like '*phronēsis*', is used by Aristotle in both a generic and a specific sense (nn. 28 and 57, and p. 259). So passages that show that something Aristotle there calls *aisthēsis* is active are fully compatible with my account of *phantasia*, and were meant to be (cf. 258, where I emphasize this evidence, and Commentary, 334, where I discuss the *De Motu*'s notion of

the *kritikon*). But my writing does not always explicitly make this point, and there are some claims about the insufficiency of *aisthēsis* for the explanation of action that could easily be misconstrued in consequence.

Three years ago, G.E.L. Owen died suddenly at the age of sixty. He inspired and continuously encouraged this book and all my work in the field from its very beginning. It is difficult to express adequately my deep gratitude for his teaching, his example, and his friendship. If an already dedicated book can have, informally, an additional dedication, I should like to dedicate this edition to his memory.

BIBLIOGRAPHY (1985)

- Balme, David M. Review. *Journal of the History of Philosophy* 20 (1982): 92–5. A substantial discussion of issues of teleology and explanation.
- Barnes, Jonathan. Review. *The Classical Review* 30 (1980): 222–26. Contains a series of suggestions on textual and philological points.
- Bogen, James. Review. *Synthese* 55 (1983): 373–88. A substantial discussion of teleology and explanation.
- Burnyeat, M. F. Review. *Archiv für Geschichte der Philosophie* 63 (1981): 184–89. Contains a detailed critical discussion of this book's position on the practical syllogism.
- Gotthelf, Allan. Reviews. *Journal of Philosophy* 87 (1980): 365–77, and *Review of Metaphysics* 35 (1982): 619–23. This extensive two-part article contains especially detailed discussions of teleology (*JP*) and function (*RM*).
- Hardie, W.F.R. *Aristotle's Ethical Theory*. 2nd ed., Oxford: 1982. Appended Notes, 405–7. An acute critical discussion of this book's position on psychological and physiological explanation, which coincided with the main lines of the self-criticism worked out in "The Common Explanation."
- Kenny, Anthony. "A Stylometric Comparison between five disputed works and the remainder of the Aristotelian corpus." In *Zweifelhafes im Corpus Aristotelicum*, ed. P. Moraux and J. Wiesner. Berlin: 1983, 345–66. Argues that there are no stylistic reasons for impugning the authenticity of the *De Motu*.
- Kung, Joan. "Aristotle's *De Motu Animalium* and the Separability of the Sciences," *Journal of the History of Philosophy* 20 (1982): 65–76.

- A discussion of issues raised in Essay 2 concerning the *De Motu* and the autonomy of the sciences.
- Nussbaum, M. C. "Saving Aristotle's Appearances." In *Language and Logos*, ed. M. Schofield and M. Nussbaum. Cambridge: 1982, 267–93.
- . "The Common Explanation of Animal Motion." In *Zweifelhafes im Corpus Aristotelicum*, 116–56.
- . "Reply to Howard Robinson," *Oxford Studies in Ancient Philosophy*, no. 2 (1984): 197–207.
- Owen, G.E.L. "Aristotelian Mechanics." Forthcoming, in G.E.L. Owen, *Logic, Science, and Dialectic: Collected Papers in Greek Philosophy*, ed. M. C. Nussbaum. London: 1986. Also in a Festschrift volume for David Balme, ed. A. Gotthelf, Pittsburgh: 1986. A detailed discussion of Aristotle's use of mathematical models in the scientific works—cf. the Commentary on ch. 1.
- Todd, R. Review. *Phoenix* 34 (1980): 352–55. Contains some arguments about the relationship between *aisthēsis* and *phantasia*.

PART I

**AUTHENTICITY, TEXT TRANSMISSION,
AND MANUSCRIPTS**

CHAPTER 1

THE AUTHORSHIP AND DATING OF THE *DE MOTU ANIMALIUM*

The authenticity of the *De Motu Animalium*, frequently denied in the nineteenth century under the influence of Rose, Brandis, and Zeller,¹ is now generally accepted. Jaeger's pioneering article and critical edition,² as well as the excellent work on both text and content by Farquharson in notes to his Oxford translation, reawakened interest in this neglected text and dispelled many of the doubts that had surrounded it. But in recent years defenders of the *MA* have argued that its acceptance into the Aristotelian *corpus* depends on our adopting a certain view about the order of composition of Aristotle's works. Questions of authenticity and of dating have been closely linked by both Nuyens and Torraca,³ though they advance different views of Aristotelian chronology. Let us first examine the arguments which have been used to deny authenticity, and point to general lines of defence. Then we shall analyze and assess the chronological arguments.⁴

Four objections have been raised against the *MA*: 1) the lack of external evidence for its membership in the *corpus* from an early date; 2) the uncharacteristic heterogeneity of its contents; 3) a purported reference in the tenth chapter to the spurious and late *De Spiritu*; and 4) the supposed inconsistency of the psychology, especially as presented in the city simile in chapter ten, with the theory of other genuine works.

The first objection is based on the alleged absence of the *MA*

¹ V. Rose, *De Arist. libr. ordine*, 162 ff.; Brandis, *Handbuch*, II b 2, 1172 ff.; Zeller, *Phil. der Gr.*, II 2^a 97. A. 2.

² Jaeger, "Pneuma" and *MA*.

³ Nuyens, *L'évolution*, especially 55; Torraca, "Sull' autenticità."

⁴ Jaeger, "Pneuma," and Torraca, "Sull' autenticità" should be consulted for supplementary material.

from various lists of Aristotle's writings surviving from antiquity. Moraux's work on the lists⁵ has now shown this objection to be invalid. The *MA* does appear in just the lists where its presence might be expected; it was excised from these for a time only because previous editors already believed it spurious. We do not expect to find the *MA* in the main portion of the catalogue preserved in Diogenes Laertius and Hesychius; none of the biological works—excepting the *HA* and the *Anatomai*, popular in the late Lyceum⁶—appears here. In fact, the absence of this group from the lists is the strongest argument for its assignment to Aristotle's successor, Ariston of Ceos, rather than to the Alexandrian Hermippus.⁷ Although we have no evidence that Aristotle's successors used these works, they were present in Alexandria from an early date.⁸ The *MA* does appear in two catalogues that appear to descend from lists of Aristotle's works made by Andronicus of Rhodes (ca. 30 B.C.), and in a location that indicates that Andronicus classified it as a genuine, major work, rather than with dubious or

⁵ Moraux, *Listes*.

⁶ Cf. Wehrli, *Die Schule*, V fr. 18, VIII frs. 125–32, III frs. 106–110.

⁷ In favor of Ariston, cf. Moraux, *Listes*, 243 ff. Düring restated the case for the traditional attribution to Hermippus in "Ariston or Hermippus?" His answer to the problem of the biological works (of which he says: "It is inconceivable that the Alexandrian library should not have possessed copies of these works") is that Hermippus did not compile his own list, but made use of an old inventory. This argument is rejected utterly by Keaney, "Two Notes," 61: "The conclusion, that the catalogue is an old inventory which Hermippus used, is not only irrelevant to these arguments but actually contradicts them. If the catalogue is Alexandrian, the omission in it of works which Alexandrian scholars used and which the Alexandrian library possessed is impossible to explain. This is true whether the catalogue's origin is put in the early years of the library or in the time of Hermippus." Keaney gives further arguments in favor of Ariston based on the listing of the *politeiai*.

⁸ They were used extensively by Aristophanes of Byzantium (ca. 257–195 B.C.) in composing his *Epitome* of the *HA*, much of which is preserved in the Byzantine *De Natura An.* (ed. Lambros). The *MA* is not directly cited (all references to the *MA* listed in Lambros' index are actually to the *IA*), but it contains none of the anecdotal information about particular species in which Aristophanes was interested. The *MA* was probably a part of the collection to which he had access.

spurious writings.⁹ Appendix A2 to the Hesychian catalogue—which, Moraux argues, was based on Andronicus's edition and composed in order to fill a lacuna in the older Ariston list¹⁰—mentions the *MA* along with the other major biological and physical treatises. The catalogue of Ptolemy, as preserved in two thirteenth-century Arabic versions, includes the *MA* among the major, genuine works, rather than with *spuria* or *hupomnēmata*. Although the Arabic writers, ignorant of the *MA* (indeed also of the *IA* and most of the *PN*¹¹), conflate the *MA* title with that of the *Anatomai*, writing "On the Movement of Animals and their Anatomy," most editors agree in restoring two separate titles when the Greek version is reconstructed.¹² Baumstark's argument that the *MA*, which on other grounds he believed spurious, was interpolated into the list¹³ is very implausible. It is much more likely that an unfamiliar title would be misread and mishandled than that a spurious work unknown in the Arab world would be added by Arab translators.

There is, then, as much early external evidence for the authenticity of the *MA* as there is for any of the major works with whose tradition it is associated. In the years immediately following the edition of Andronicus, Nicolaus of Damascus wrote a compendium of the biological works in nineteen books that included the *MA*; it is said explicitly by Averroes to have been his only source of information about its contents.¹⁴

⁹ On Andronicus' edition, see Moraux, *Aristotelismus*, 45–142, with bibliography. Plezia has a good brief summary. Littig's reconstruction of the *pinakes* (*Andronikos*) is outdated, but still useful on some points.

¹⁰ Moraux, *Listes*, 252. The post-Andronican origin is confirmed by the use of the title *phusikē akroasis* (cf. Simplicius, *In Ph.* 923, 7). Cf. also Moraux, *Aristotelismus*, 93.

¹¹ Cf. Peters, *Aristoteles Arabus*, 45–46; Steinschneider, "Die *PN*," 477–92.

¹² So Moraux, *Listes*, 297; Littig, I, 31 and 39; Müller, "Das arabische Verzeichniss," 20; Steinschneider, *Berlin Aristotle V*, 1471 a.

¹³ In *A. bei den Syrern*, I 77–78; his view was accepted by Plezia, 32–35. The claim is that since the *MA* is late and spurious, Andronicus could not have included it.

¹⁴ Cf. Moraux, *Aristotelismus*, 480, and Averroes, *Comm. magn. in DA*, 524, 59 Crawford.

Most of the early Greek commentators knew the treatise as genuine, though no pre-Byzantine commentary survives. Alexander and Themistius paraphrase major portions of its argument; Simplicius discusses it less fully and expresses confusion about its doctrine of *pneuma*; Philoponus refers to it, but seems ignorant of its contents.¹⁵ No commentator of any sort before the nineteenth century seems to have impugned its authenticity.

The objection based on the *MA*'s content was advanced most influentially by Rose,¹⁶ who found the juxtaposition of heterogeneous matter un-Aristotelian. (But even he does not deny the interest of the treatise: "Insignis certe auctoris praeclara et diligens disputatio.") His argument is based on a narrow view of Aristotle's methodology for which there is some evidence in the treatises, but which is not an adequate account of his procedure even in his earlier writings. It is true that the *MA* is "interdisciplinary" to an extent probably unparalleled in the *corpus*. But its heterogeneous contents are not just unrelated scraps of argument; they are parts of a carefully organized whole. Essay 2 will argue that the *MA* offers a view of the interdependence of the sciences that is a useful advance over Aristotle's earlier theories.

The most influential objection concerns the doctrine of *pneuma* in the tenth chapter. Rose insisted that the degree of importance accorded *pneuma* in the treatise was inconsistent with Aristotelian practice elsewhere. This impression was corrected by Jaeger's careful elucidation of passages in the *GA* and other works. One can now consult the surveys of Beare, Ross, Peck, and, most recently, Balme for similar verdicts.¹⁷ The discussion of the role of *pneuma* in the treatise that is offered

¹⁵ Alexander, *In Meteor.*, 3, 34-4,6; Alex., *DA*, 97,26; Themistius, *In DA*, 121,1-18; *In DC*, 97,20; Simplicius, *In DA*, 303,22 ff.; *In DC*, 398,18 ff.; *In Ph.* 3,6 ff.; Philoponus, *In Meteor.*, 9, 15; *In Ph.* 2,7; *In DA*, 591,22 and 587,24 ff. For a more extensive discussion of these allusions, see my doctoral thesis, chapter 2.

¹⁶ Rose, 163-164.

¹⁷ Beare, *Greek Theories*, 333 ff.; Ross, *PN*, 40-43; Peck, *GA*, 576-93, and "The connate *pneuma*," 111-121; Balme, *PA-GA*, 158-65. Further references are in Essay 3.

in Essay 3 attempts to show in more detail the relation between the *MA* doctrine and that of other works, and the notes on chapter 10 add more material.

Rose denied that the *MA* could be connected with the obviously inferior *De Spiritu*. But Zeller¹⁸ claimed to find, in the sentence *τις μὲν οὖν ἡ σωτηρία τοῦ συμφύτου πνεύματος, εἴρηται ἐν ἄλλοις* (703^a10-11), a precise reference to the opening of the *De Spiritu*: *τις ἡ ἐμφύτου πνεύματος διαμονή, καὶ τις ἡ αὐξήσις*; (481^a1-2). As I argue in a note *ad loc.*, there is no good reason to believe this. Other genuine passages will suit the reference better. And in general we have every reason to dissociate this careful and interesting treatise from the messy later work. On this point Jaeger's impatience with the credulity of his contemporaries seems justified: "Nitidissimum de animalium motione libellum quo iure homines docti cum obscuri physiologi seu philosophi miserabili fructu una tractaverint, vix intellegas."¹⁹

The city analogy which concludes the tenth chapter of the *MA* has provoked further serious controversy. Its claim that the soul is "in" the heart, which is the body's *archē*, was said by Poppelreuter in 1892 to be "völlig unaristotelisch."²⁰ And in 1924 Rolfes, though attempting to reconcile with the entelechy view of the *DA* the similar passage in the *Juv.* (469^b13-17), contended that the *MA* passage could not be so handled and that the treatise was probably not genuine.²¹ Jaeger apparently never felt a serious problem here. But later critics used the *MA* to illustrate the importance of employing a chronological method to account for divergence of psychological doctrine among different Aristotelian works. Nuyens convincingly linked the *MA* passage with *Juv.* 469^b13 f. and with *PA* 670^a23-26 (cf. Essay 3 for discussion of these passages), but never suggested that there was any question of impugning the authenticity of all three of these works. In the case of the *MA*, however, he concludes that we have only two choices:

¹⁸ Zeller, n. 1, *supra*.

¹⁹ Jaeger, *MA*, xviii.

²⁰ Poppelreuter, *Zur Psychologie*, 10, n. 2.

²¹ Rolfes, *Aristoteles*, 4.

to reject the authenticity of the whole treatise, or to use his "méthode prospective."²² He advances no further evidence in favor of authenticity, and yet opts without argument for his second alternative—although the *MA* problem is admittedly a crucial bit of evidence of the importance of applying his chronological method.

Ross accepts Nuyens's arguments on the dating of the *MA* (on which more below) and goes further: accepting, with Jaeger, the forward-reference in *DA* III.10 as a genuine reference to the *MA*, and granting the authenticity of the latter, he dates *DA* III earlier than the other two books, and calls it part of the same middle stage of the development of Aristotle's psychological doctrine.²³ Torraca accepts the methodological principles of Nuyens, but argues for a different conclusion: the entelechy theory and the heart theory are indeed incompatible, but the stage to which the *MA* belongs is later than the stage represented by the entelechy view of the *DA*. This enables him without difficulty to accept Jaeger's arguments based on the cross-references.

It would be difficult to find any good reason to reject the *MA* because of the city simile. The links with the doctrine of the *PN* and of other biological works hold firm (*pace* Rolfes), and no critic seriously considers impugning all of them. But a defence can take different forms. We can invoke some chronological hypothesis, or we can deny that there is any real incompatibility between the doctrine of the *MA* and that of the *DA*. I argue for the latter course in Essay 3. More general efforts along this line have been carried out by Block and Hardie.²⁴ But the problem now becomes one of chronology and exegesis; authenticity cannot be assailed on such meager grounds.

Some general considerations in favor of authenticity have been accepted by critics on both sides of the debate: the author is subtle and learned. Language and method are typically Aris-

totelian.²⁵ Jaeger's discussion of the cross-references also proves reassuring.²⁶ He establishes convincingly that the ἐν κεφαλαίῳ summary of a projected section of the *Parva Naturalia* dealing with animal motion (*DA* III.10, 433^b19–30) refers to the *MA*, and not to the *IA*, as Rose had claimed:

ὥ δὲ κινεῖ ὁργάνῳ ἢ ὁρεξί, ἥδη τοῦτο σωματικόν ἐστιν—
διὸ ἐν τοῖς κοινοῖς σώματος καὶ ψυχῆς ἔργοις θεωρητέον
περὶ αὐτοῦ. νῦν δὲ ὡς ἐν κεφαλαίῳ εἰπεῖν, τὸ κινου-
ν ὁργανικῶς ὅπου ἀρχὴ καὶ τελευτὴ τὸ αὐτό—οἷον ὁ γιγγλυ-
μός· ἐνταῦθα γὰρ τὸ κυρτὸν καὶ τὸ κοῖλον τὸ μὲν τελευτὴ
τὸ δ' ἀρχή (διὸ τὸ μὲν ἡρεμεῖ, τὸ δὲ κινεῖται), λόγῳ
μὲν ἕτερα ὄντα, μεγέθει δ' ἀχώριστα. πάντα γὰρ ὥσει καὶ
ἐλξει κινεῖται. διὸ δέ, ὥσπερ ἐν κύκλῳ, μένειν τι, καὶ
ἐντεῦθεν ἄρχεσθαι τὴν κίνησιν. ὅλως μὲν οὖν, ὥσπερ
εἴρηται, ἡ ὁρεκτικὸν τὸ ζῶν, ταύτη αὐτοῦ κινήτικόν.
ὁρεκτικὸν δὲ οὐκ ἄνευ φαντασίας. φαντασία δὲ πᾶσα ἡ
λογιστικὴ ἢ αἰσθητικὴ. ταύτης μὲν οὖν καὶ τὰ ἄλλα
ζῶα μετέχει.

As Jaeger shows, every sentence of this summary is taken up by some discussion in the *MA*: 433^b21–22 by 698^a16, 698^b2, chapter 2, 700^a12; 433^b24–25 by 698^a24–^b1, 702^a30 f., 702^b30–31; 433^b25 by 703^a19 f.; 433^b26 by 698^a18 f.; 433^b27 f. by various passages in chapters 6–8. Furthermore, the opening of the *Sens.*, which mentions a general study of *orexis* as one of the projects to be attempted in the *PN* (436^a9), probably also refers to the *MA* treatment. And there are, in fact, ample grounds for associating the *MA* with the treatises of the *PN*. Most MSS of the *Div. Somn.* conclude with a forward reference to the *MA*, which usually follows it in these MSS: περὶ δὲ κινήσεως τῆς κοινῆς τῶν ζῴων λεκτέον (in the *a* family: περὶ δὲ κινήσεως τῆς λοιπῆς τῶν ζῴων).²⁷

²⁵ On the style, see Louis's edition of the *HA*, xlv, and his *MA*, xiii.

²⁶ Jaeger, "Pneuma," 41–42.

²⁷ Only S among the major manuscripts with which we shall be concerned places the *MA* after the *Div. Somn.* without including the forward reference. But the cognate and superior O^d places the *MA* after the *DA*, the

²² Nuyens, 55.

²³ Ross, "Development," 67; *DA*, 14, 316.

²⁴ Block, "Order," and Hardie, "Aristotle's treatment."

The *MA* itself refers often to other works of Aristotle: clearly to the *HA* and *IA* (698^a3), the *PA* (704^a3, possibly 703^a17), the *Physics* (698^a9), the *Metaph.* (700^b8), the *Sens.*, *Mem.*, and *Somm.* (704^b1), the *DA* (700^b5–6, 21–22), the *GA* (704^b3), and implicitly to many other passages, as indicated in the notes. Jaeger defends the authenticity of Aristotelian cross-references which seem inseparable from context, and points out that forgery plays no part in the composition of the spurious treatises attached to the Aristotelian *corpus*.²⁸ It can be added to this that no obviously spurious work contains (according to Bonitz) any reference to any genuine Aristotelian work—except to the *Anatomai* (*Spir.* 483^b24), which quickly became a popular manual. Almost all the references in the text of the *MA* are thoroughly integrated into the argument of the treatise; they provide evidence both of its authenticity and of its membership in a course of Aristotelian lectures on natural science (cf. n. 35, *infra*). There seems to remain no serious reason to question the treatise's claim to membership in the *corpus*.

Cross-references also provide our soundest criterion of the *MA*'s relative date.²⁹ Back-reference is made to the *DA* (which refers forward to it), to *Ph.* VIII, *HA*, *IA*, *Metaph.* XII, *PA*, *Sens.*, *Mem.*, *Somm.*; but certain forward reference only to the *GA*, which is agreed to be among the last, if not the very last, of Aristotle's works. Only the references in the final sentence of the treatise may possibly constitute a later addition, and even these may also give evidence of actual date of composition. Louis notes that the *DC* (284^b13) and the *PA* (696^a11) refer to the *IA* under titles that to us seem to indicate the *MA* (see commentary on chapter 1, p. 301), and infers, probably correctly,

Div. Somm. (minus ref. to the *MA*) several treatises further on. If the common archetype of SO^a did not place the *MA* as part of the *PN*, the loss of the forward reference would be easily comprehensible.

²⁸ Jaeger, "Pneuma," 31 ff.

²⁹ On the cross-references, cf. also Thielscher, "Die relative Chronologie." Thielscher omits the *MA* from consideration, presumably because he thinks it spurious. But it would fit neatly into his scheme, giving a result in keeping with those of Jaeger and Torraca.

that these references were composed at a time when the *MA* had not yet been written. This clashes with Nuyens's theory of the development of Aristotle's psychology, but would be consistent either with Torraca's chronology or with a denial that the *MA* and the *DA* are theoretically incompatible. Even Nuyens admits the lateness of the *GA*, which raises considerable problems for his thesis, and he offers us no way of accounting for the cross-references. I do not want to engage here in a lengthy critique of Nuyens's views. His critics have discredited crucial points in his argument, and articles by Owen and Düring have undermined the assumption, which he shares with Jaeger, that Aristotle began his career as a faithful Platonist and became progressively more independent.³⁰ A much more plausible hypothesis about the chronology of Aristotle's psychological writings, consistent with a late dating for the *MA*, has been advanced by Kahn,³¹ who pays much more attention than Nuyens or Jaeger to the crucial question of how the nature of Aristotle's particular problem in a given treatise influences the kind of theoretical development he presents. It is dangerous to assume that in each work Aristotle set out to tell us everything he believed about a given problem, and fatal in the case of the *MA*, whose relation to the account of action in the *DA* is so clearly expressed by Aristotle himself. It does not follow from the correct observation that the *MA* devotes itself to the relationships between psychological and physiological processes, which had not been a central concern of the *DA*, that Aristotle only learned the importance of physiological study late in his career from certain Sicilian doctors.³²

The cross-references are our most objective criterion; but there is other evidence for a relatively late date. The whole project of much of the treatise is to bolster the arguments of *Physics* VIII by an analysis of animal self-motion. It is impossible that the *MA* as it stands could have been written without

³⁰ Owen, "Platonism"; Düring, "A. the Scholar." See further criticisms of Nuyens in Essay 3.

³¹ Kahn, "Sensation and Consciousness."

³² As is argued, for example, by Torraca, "Sull' autenticità."

these arguments. The treatise to which the *MA* seems closest, for several reasons, is, in fact, the *GA*. The theory of *pneuma*, central in the *MA*, receives there its fullest exposition. This theory seems to be one that Aristotle began to develop relatively late in his biological writings, and that he was still in the course of developing.³³ The striking example of the automatic puppets in *MA* 7 is used twice in the *GA* to make a very similar point, and only once otherwise in the entire *corpus*—in *Metaph.*I, where its purpose is somewhat different (see note to chapter 7, 701^b1ff.). We may have further evidence for a late date in Moraux's suggestion³⁴ that the works omitted from the list which he attributes to Ariston were those that were left unrevised at the time of Aristotle's death. Among these would be *GA*, *MA*, *DA*, *PN*, *PA*, and *IA*.

It seems likely, then, that the *MA* was written towards the end of Aristotle's second stay at Athens; it acknowledges its debt to previous biological writings dedicated to the explication of the physiology of particular species, and produces a unique synthesis of material previously discussed in separate works.³⁵

³³ This view is shared by Balme, *PA-GA*, 161 ff.

³⁴ Moraux, *Listes*, 320.

³⁵ Jaeger ("Pneuma") and Mansion (*Introduction*, 7 ff.) use the cross-references to establish that Aristotle had two (or three) different plans for series of lectures in biology: a short series, in which the *PA* is directly followed by the *GA*, and a long series: *PA-IA* (regarded as a single work), *DA*, *Sens.*, *Mem.*, *Somn.*, *Insomn.*, *Div. Somn.*, *MA*, *GA*. The combined cross-references of the *MA* provide a summary of the entire series.

CHAPTER 2

THE MANUSCRIPTS

The text presented here is an entirely new critical edition, based on a re-examination of all previously collated manuscripts and a full collation of five new ones, selected on the basis of a preliminary investigation as likely to prove of particular interest. In a recent article¹ I have described at length the defects of previous editions and have presented an extensive analysis of my results, arguing for the reconstruction of manuscript families that I shall here summarize. The article also contains a full positive apparatus to the treatise, designed to be used with the 1973 Budé text of Louis, and a number of notes justifying emendations or selections. For this reason, I shall give here only a very brief summary of the tradition; and the apparatus that accompanies the text will be considerably shorter than the apparatus presented in the article.

The *MA* is extant in forty-four Greek manuscripts, many of which are of no importance for the text.² The manuscripts that concern us fall into two reasonably well-defined families: the family *a*, whose oldest extant member is E (Par. gr. 1853), dating from the mid-tenth century; and the family *b*, which for the *DC* has as its earliest witness our oldest Aristotle manuscript, J (Vindob. phil. gr. 100), from the middle of the ninth century. Though there is some evidence that J once included the text of the biological works, this portion of the manuscript

¹ "The Text of Aristotle's *De Motu Animalium*." For all references to the literature on these manuscripts, the reader is referred here, and to the more extensive descriptions and collations in my thesis.

² See the list given in Louis's *MA*, 47–48. Cod. Bodl. Canon. 107, however, is a printed edition and should not have been included. Cf. also Wartelle, *Inventaire*; this also cites Cod. Par. Coisl. 166, a MS that, however, contains only the last few lines of the *MA*.

does not survive.³ For the *MA* we must rely on a number of later manuscripts of this family, which fall into fairly well-defined sub-groups. There is, in addition, a tradition independent of both major families, represented occasionally in P and T (William of Moerbeke's translation), though both of these belong for the most part to the *b* family. In the indirect tradition, there is little of any use.⁴ Michael of Ephesos' commentary, Leonicus's translation, and the paraphrase of Albertus Magnus all belong to the *b* family, or are eclectic.

THE *A* FAMILY

The members of *a* contain, individually, fewer peculiar errors than the single members of *b*. However, when we examine the readings that separate the two families, we find that *a* has the better reading in only nine passages, *b* in twenty-four. The editorial decision of both Bekker and Louis to give a general preference to *a* (and especially E)—a dubious policy even if grounded in an accurate recording of all the data—can no longer be justified. As our knowledge of the *b* family increases, E's authority is diminished. In three passages for which Jaeger claims that *a* alone has the correct reading (699^b5, 700^b14, 700^b25), three *b* manuscripts collated since his edition (X, L, and H^a) also show the right reading; in another case (699^b19), N, a member of *b*, now joins the *a* manuscripts. And yet it remains true that *a*'s principal exemplars, E and Y, are two good early manuscripts, relatively free from idiosyncratic error. We should abandon once and for all the questionable procedure of preferring one of these families to the other in a general way; each passage must be judged on its merits.

E (Par. gr. 1853, s. x) and Y (Vat. gr. 261, s. xiii–xiv) are the major manuscripts of the *a* family. Although some editors have argued that for other treatises Y is a mere copy of E, this

³ Cf. Irigoin, "L'Aristote de Vienne"; the two-page fragment of the *HA* found as ff. 13–14 of Par. suppl. gr. 1156 is in the same hand as J.

⁴ But see 702^b19, 703^a22 for examples of some support from the commentators for contested readings.

conclusion (unlikely in the other cases) is completely implausible for the *MA*. Y is a valuable independent witness. Where the two differ, E has the better reading in twenty-one passages, Y in twenty-eight (of which five are differences of breathings only). E is never alone in preserving the correct reading, but Y (with V) is alone at 702^a22.

V (Vat. gr. 266, s. xiv) is another *a* manuscript that may be of some independent value. It is a badly damaged manuscript, with numerous corrections (from a *b* manuscript) and attempts at repair. Although it is for these reasons difficult to use, it can occasionally be helpful in confirming the reading of one *a* manuscript against another.

THE *B* FAMILY

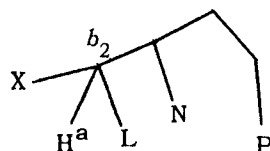
Within this family, there are two well-defined sub-families: *b*₁, containing S and O^d, and *b*₂, containing X, L, and H^a. In addition, there are two manuscripts, P and N, that are closer to *b*₂ than to *b*₁ and seem to descend from a common source with the *b*₂ manuscripts, although P (with William's manuscript) has access to the independent tradition as well. Also in *b* are the manuscripts used by Michael and Leonicus.

The symbol *b*₁ designates the shared readings of S (Laur. Plut. 81,1) and O^d (Marc. gr. Z 209). O^d was not consulted at all by previous editors of this treatise, but, although it is badly damaged, it seems to be superior to the much-used S, a better copy of a common source. Where the two differ, S has the better reading in only eight passages, O^d in twenty-five. Together they are alone in showing the correct reading at 701^b4, and alone among *b* manuscripts at 698^a19, 698^b19, 700^b3, 700^b20, 701^a24, 701^b2, 702^a13, 703^b4, 703^b22, 704^a2.

The symbol *b*₂ designates the shared readings of X (Ambrosianus 435 (H 50 sup.), s. xii–xiii), H^a (Marc. gr. Z 214, s. xiii–xiv), and L (Vat. gr. 253, s. xiv in.). Each of these three manuscripts appears to be an independent descendant of a common source. Only X has previously been collated for the *MA* (by Torraca, with numerous errors); but it is the worst

of the three, showing nineteen peculiar errors, as against H^a's twelve and L's six. None can be neglected; and the family as a whole makes important contributions, especially at 700^a26, where Jaeger's good emendation is confirmed.

P (Vat. gr. 1339) and N (Vat. gr. 258) descend ultimately from a common archetype with the *b*₂ group. The picture is something like this:



P has been a very controversial manuscript, with regard both to its date and to its value. We can now confidently date it to the second half of the fourteenth century. But, despite its amazingly large quota of errors (eighty-three peculiar errors for the *MA* alone), it does prove of independent value—both as a witness in *b* and as a source of a tradition independent of both *a* and *b*. This tradition is alone to preserve the right reading at 700^a23–24 (a very striking passage, deformed beyond recall in all other extant MSS), and 700^b35. N, like P, is an extremely careless manuscript, but it can occasionally prove important in restoring the readings of *b*.

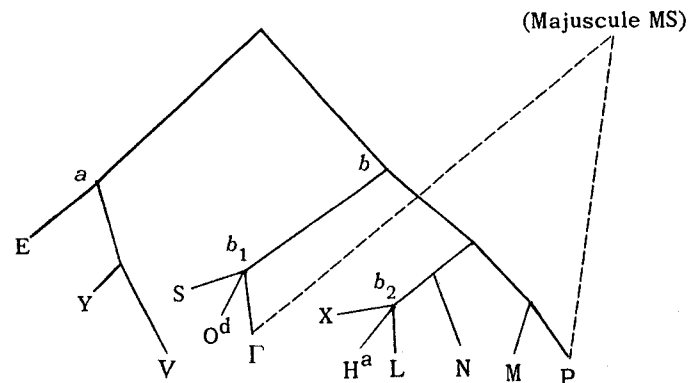
Michael of Ephesos, the twelfth-century commentator on the *MA*,⁵ used a *b* manuscript closely related to P (but without P's independent source). William of Moerbeke's translation⁶

⁵ Michael is probably not a pupil of Psellus, as had previously been supposed, but is to be associated instead with the twelfth-century circle of Aristotelians around Anna Comnena—see Browning, "An Unpublished Funeral Oration." His career as a commentator is discussed in my doctoral thesis.

⁶ William's translation was edited by Torraca and included with his edition of the Greek text; my doctoral thesis gives a detailed analysis of his usage. The major source for his life and work is Grabmann, *Guglielmo di Moerbeke*.

shares, with P, access to the independent source at 700^a23–24 and 700^b35; otherwise his manuscript, though primarily in *b*, shows signs of *a* contamination. Leonicus's translation⁷ represents an eclectic tradition of little value.

STEMMA



THE APPARATUS

The positive apparatus I presented in *HSCP* included all the readings of EYSO^aH^aXL; N and P were cited only where they seemed to contribute something of value. This policy resulted in the inclusion of a number of readings that were not at all plausible, but had some historical interest, as showing something about the character of individual manuscripts. This apparatus is much more selective. I have omitted many errors peculiar to a single manuscript, and some errors, obviously of no value, shared by two or three. I have been particularly brief wherever the correct reading is not in doubt. For further information, the reader should consult *HSCP*, and, for complete collations of all these manuscripts, my doctoral thesis (Harvard, 1975).

⁷ Nicolaus Leonicus Thomaeus (ca. 1456–ca. 1533) is the author of the Latin translation of the *MA* printed in vol. III of the Berlin Aristotle, 342^a–45^b.

PART II

TEXT AND TRANSLATION

NOTE ON THE TRANSLATION

I have tried to make this English version one that a philosopher unfamiliar with Greek could use, without reference to the text, in working on the *MA*. The claims of fidelity have therefore been ranked above those of elegance and naturalness. This means that I have nowhere achieved the grace of Farquharson's English, and that, unlike him, I have kept exegesis to a minimum in the translation itself, trying instead to reproduce the ambiguities of the original. Wherever some filling in seems necessary for any sense at all to emerge, my supplements are enclosed in pointed brackets (cf. 700^a32-4, 701^b37-702^a1, 702^b1-2). In three passages for which I have suggested deletions from the MSS text and justified these in the notes, I have retained the deleted words in square brackets for the reader's benefit (701^b20, 701^b1, 703^b22-23).

The outstanding difficulty confronting the translator of the *MA* is the rendering of *κίνησις* and related words. *κίνησις* means "change" in general, not simply "motion," but throughout the treatise it most often refers specifically to local motion (cf. note on 698^a1). I have translated *κίνησις* by "movement" or "motion" throughout to indicate that Aristotle himself employs a single term, even where, as at 700^a29 and 701^a3, "change" seems more appropriate. Another problem is the rendering of *κινεῖσθαι*, which, except in future and aorist forms, is ambiguous between middle and passive. Where forms do not differ, I have used either intransitive "move" or "be moved" depending on context (there is usually no significant difference of sense); but "imparts movement" is always used for active forms, unless context makes "moves" completely unambiguous. *ἀκίνητον* is doubly ambiguous: between "motionless" and "unmoved," and, more important, between both of these and "immovable." In this case, the commentary must be consulted for a discussion of the problem.

Two crucial terms, *phantasia* and *pneuma*, remain untrans-

lated, the latter only in those passages where it is given a special technical sense, rather than in those talking of ordinary breath or wind. My decision not to translate *phantasia* implies not that the term is more highly technical than the related terms surrounding it which are translated, but only that special problems demand a fuller analysis, and make precise rendering difficult. Essays 3 and 5 are devoted to these questions. For somewhat similar reasons, another Aristotelian term, *alloiōsis*, has been given the literal translation "alteration," rather than the more interpretive "qualitative change." The Commentary explores the problem of distinguishing *alloiōsis* from the other kinds of Aristotelian change (cf. especially note on 701^b13).

SIGLA

- E = cod. Par. gr. 1853, s. x.
 E² = quae in eodem codice manu altera (s. x) addita vel correcta leguntur.
 H^a = cod. Marc. gr. Z 214, s. xiii-xiv.
 L = cod. Vat. gr. 253, s. xiv in.
 O^d = cod. Marc. gr. Z 209, s. xii-xiii.
 S = cod. Laur. Plut. 81,1, s. xii-xiii.
 X = cod. Ambr. H 50 sup., s. xii-xiii.
 Y = cod. Vat. gr. 261, s. xiii-xiv.
 Raro citantur N = cod. Vat. gr. 258, s. xiv. in.
 P = cod. Vat. gr. 1339, s. xiv.
 V = cod. Vat. gr. 266, s. xiv.
 V² = quae in eodem codice manu recentiore correcta leguntur.

a = EY

b = O^dSXH^aLPN

*b*₁ = O^dS

*b*₂ = XH^aL

M^e = Michaelis citationes

M^l = Michaelis lemmata

M^p = Michaelis paraphrasis

Γ = Guillelmi Moerbekensis translatio

Λ = Nicolai Leonici translatio

A.M. = Alberti Magni paraphrasis

Fq. = Farquharson

Düring = I. Düring, *Gnomon* 31 (1959), 415-418.

MorauX = P. MorauX, *AntCl* 28 (1959), 363-366.

Platt = A. Platt, *JP* 32 (1912-13), 295.

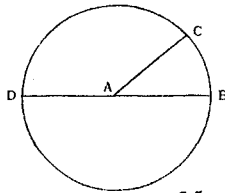
Wilson = J. Cook Wilson, *JP* 32 (1912-13), 137-65.

The precise line-divisions of the Bekker edition have been followed. Where my paragraphing differs from his, two lines will frequently represent one Bekker line.

ON THE MOVEMENT OF ANIMALS

1 The movement of the animals that belong to each 698^a
genus, and how these are differentiated, and what the
reasons are for the accidental characteristics of each—
all this we have considered elsewhere. But now we
must consider in general the common reason for mov-
ing with any movement whatever (for some animals 5
move by flying, some by swimming, some by stepping,
some in other comparable ways).

Now we determined before, in our discussion of
eternal motion (whether or not there is such a thing,
and, if there is, what it is), that the origin of other
movements is that which moves itself, that the origin 10
of this is the unmoved, and that the first mover must
necessarily be unmoved. We must however, grasp
this not only generally and in theory, but also in the
particular cases and in objects of sense-perception; it
is through these that we go on to look, as well, for
general explanations, which we believe must be in har-
mony with them. For it is clear in perceptible objects,
too, that it is impossible for there to be movement if 15
nothing is at rest—and, above all, in animals, our
present concern. For if one of the parts moves, there
must be some part at rest; and it is for this reason that
animals have joints. For they use their joints like a cen-
ter, and the whole section containing the joint becomes
both one and two, both straight and bent, changing 20
potentially and actually by reason of the joint. And
when the part is bending and being
moved, one of the points in the joints is
moved and the other remains at rest, just
as if on a diameter AD should remain
fixed and B be moved, so as to give AC.
But in the geometrical example the
center appears to be indivisible in every



1 Περὶ δὲ κινήσεως τῆς τῶν ζώων, ὅσα μὲν αὐτῶν περὶ 698^a
ἕκαστον ὑπάρχει γένος, καὶ τίνες διαφοραί, καὶ τίνες αἰτίαι
τῶν καθ' ἕκαστον συμβεβηκότων αὐτοῖς, ἐπέσκειται περὶ
ἀπάντων ἐν ἑτέροις. ὅλως δὲ περὶ τῆς κοινῆς αἰτίας τοῦ κι-
νεῖσθαι κίνησιν ὅποιοι οὖν (τὰ μὲν γὰρ πτήσσει κινεῖται τὰ 5
δὲ νεύσει τὰ δὲ πορεύα τῶν ζώων, τὰ δὲ κατ' ἄλλους τρό-
πους τοιοῦτους) ἐπισκεπτέον νῦν.

Ὅτι μὲν οὖν ἀρχὴ τῶν ἄλλων
κινήσεων τὸ αὐτὸ ἑαυτὸ κινεῖν, τούτου δὲ τὸ ἀκίνητον, καὶ ὅτι
τὸ πρῶτον κινεῖν ἀναγκαῖον ἀκίνητον εἶναι, διώρισται πρότε-
ρον, ὅτεπερ καὶ περὶ κινήσεως αἰδίου, πότερον ἔστιν ἢ οὐκ ἔστι, 10
καὶ εἰ ἔστι, τίς ἔστιν. δεῖ δὲ τοῦτο μὴ μόνον τῷ λόγῳ κα-
θόλου λαβεῖν, ἀλλὰ καὶ ἐπὶ τῶν καθ' ἕκαστα καὶ τῶν αἰ-
σθητῶν, δι' ὅπερ καὶ τοὺς καθόλου ζητοῦμεν λόγους, καὶ ἐφ'
ὧν ἐφαρμόττειν οἰόμεθα δεῖν αὐτούς. φανερόν γὰρ καὶ ἐπὶ
τούτων ὅτι ἀδύνατον κινεῖσθαι μηδενὸς ἡρεμούντος, πρῶτον 15
μὲν οὖν ἐν αὐτοῖς τοῖς ζώοις. δεῖ γὰρ, ἂν κινήται τι τῶν μο-
ρίων, ἡρεμεῖν τι καὶ διὰ τοῦτο αἱ καμπαὶ τοῖς ζώοις εἰσίν.
ὥσπερ γὰρ κέντρῳ χρώνται ταῖς καμπαῖς, καὶ γίνεται τὸ
ὅλον μέρος, ἐν ᾧ ἡ καμπή, καὶ ἐν καὶ δύο, καὶ εὐθὺ καὶ
κεκαμμένον, μεταβάλλον δυνάμει καὶ ἐνεργείᾳ διὰ τὴν 20
καμπήν. καμπτομένου δὲ καὶ κινουμένου τὸ μὲν κινεῖται ση-
μεῖον τὸ δὲ μένει τῶν ἐν ταῖς καμπαῖς, ὥσπερ ἂν εἰ τῆς
διαμέτρου ἡ μὲν ΑΔ μένοι, ἡ δὲ Β κινεῖτο, καὶ
γίνετο ἡ ΑΓ. ἀλλ' ἐνταῦθα μὲν δοκεῖ πάντα τρόπον ἀδιαίρε-
τον εἶναι τὸ κέντρον (καὶ γὰρ τὸ κινεῖσθαι, ὡς φασί, πλάτ- 25

περὶ τῆς τῶν ζώων κινήσεως b_1 : περὶ ζώων κινήσεως πρῶτον N:
de causa motus animalium Γ 698^a1 κινήσεως post ζώων b_1
τῆς om. b_2 PN περὶ ἕκαστον αὐτῶν bM^1 11 *tis*] τί YV
τῷ λόγῳ καθόλου ab_1N : καθόλου τῷ λόγῳ b_2 ΓA.M.: καθόλου om.
PM¹ 12 τῶν post καὶ om. b_1 ἐπὶ τῶν αἰσθητῶν b_2 Γ
16 οὖν om. b 19 ᾧ ἔστιν ἡ b_2 PN 23 ἡ μὲν ΑΔ scripsi:
ἡ μὲν Α καὶ Δ EV b_2 PNM^c: ἡ μὲν Α καὶ ἡ Δ E²Y b_1 24 ἡ ΑΓ
aMPA: ἡ Α καὶ Γ b Γ: ἡ ΔΑΓ Wilson

respect (for the motion they speak of is also a fiction: no mathematical entity moves); whereas in the case of joints the centers become, both potentially and actually, now one, now divided. In any case, the origin relative to which the motion takes place, *qua* origin, is always at rest when the part below it is moved, as, for example, when the forearm is moved the elbow remains at rest, but when the whole limb is moved, the shoulder. And when the lower leg is moved, the knee, but when the whole leg is moved, the hip. It is obvious, then, that each animal must have something at rest within itself as well (sc. as without), to provide that which is moved with its origin, and supporting itself against which it will move both all at once as a whole, and part by part.

- 2 But any rest within the animal is nonetheless ineffectual, if there is not something outside which is unqualifiedly at rest and unmoved. It is worth pausing to consider what has been said; for it has implications extending beyond animals to the motion and course of the universe. For just as there must be something unmoved within the animal, if it is going to move, so even more there must be something outside the animal which is unmoved, supporting itself against which that which moves is moved. For if it gives way all the time, as when tortoises walk in mud or men on sand, the creature will not advance, and there will be neither stepping, if the ground should not remain still, nor flying nor swimming, if the air or the sea should not offer resistance. And that which offers resistance must be other than that which is moved, and wholly different from the whole of it; and what is thus unmoved must be no part of what is moved. If not, it will not be moved. Evidence for this is found in this problem: why is it that someone can easily move a boat from outside, if he shoves it along with a pole, putting it against the mast or some other part; but if he should try to do this

τουσιν ἐπ' αὐτῶν οὐ γὰρ κινεῖται τῶν μαθηματικῶν οὐδέν), τὰ δ' ἐν ταῖς καμπαῖς δυνάμει καὶ ἐνεργείᾳ γίνεται ὅτε μὲν ἐν ὅτε δὲ διαιρετά. ἀλλ' οὖν αἰεὶ ἡ ἀρχὴ ἢ πρὸς ὃ, ἢ ἀρχή, ἡρε- 698^b
μεῖ κινουμένου τοῦ μορίου τοῦ κάτωθεν, οἷον τοῦ μὲν βραχίονος κινουμένου τὸ ὠλέκρανον, ὅλου δὲ τοῦ κόλου ὁ ὦμος, καὶ τῆς μὲν κνήμης τὸ γόνυ, ὅλου δὲ τοῦ σκέλους τὸ ἰσχίον. ὅτι μὲν οὖν καὶ ἐν αὐτῷ ἕκαστόν τι δεῖ ἔχειν ἡρεμοῦν, ὅθεν ἡ ἀρχή 5
τοῦ κινουμένου ἔσται, καὶ πρὸς ὃ ἀπεριεχόμενον καὶ ὅλον ἀθρόον κινήσεται καὶ κατὰ μέρος, φανερόν.

- 2 Ἀλλὰ πᾶσα ἡ ἐν αὐτῷ ἡρεμία ὅμως ἄκυρος, ἂν μή τι ἔξωθεν ἢ ἀπλῶς ἡρεμοῦν καὶ ἀκίνητον. ἀξίον δ' ἐπιστήσαντας ἐπισκέψασθαι περὶ τοῦ λεχθέντος· ἔχει γὰρ τὴν θεωρίαν οὐ μόνον ὅσον ἐπὶ τὰ ζῷα συντείνουσιν, ἀλλὰ καὶ πρὸς τὴν τοῦ παντὸς κίνησιν καὶ φοράν. ὥσπερ γὰρ καὶ ἐν αὐτῷ δεῖ τι ἀκίνητον εἶναι, εἰ μέλλει κινεῖσθαι, οὕτως ἔτι μᾶλλον ἔξω δεῖ τι εἶναι τοῦ ζώου ἀκίνητον, πρὸς ὃ ἀπεριεχόμενον κινεῖται τὸ κινούμενον. εἰ γὰρ ὑποδώσει αἰεὶ, οἷον τοῖς ἐμύσει τοῖς ἐν πηλῷ ἢ τοῖς ἐν τῇ ἄμμῳ πορευομένοις, οὐ πρόεισιν, οὐδ' ἔσται οὔτε πορεία, εἰ μὴ ἡ γῆ μένοι, οὔτε πτήσις ἢ νεῦσις, εἰ μὴ ὁ ἀῆρ ἢ ἡ θάλαττα ἀντερείδοι. ἀνάγκη δὲ τοῦτο ἕτερον εἶναι τοῦ κινουμένου, καὶ ὅλον ὅλου, καὶ μόνον μηδὲν εἶναι τοῦ κινουμένου τὸ οὕτως ἀκίνητον· εἰ δὲ μή, οὐ κινήσεται. μαρτύριον δὲ τούτου τὸ ἀπορούμενον, διὰ τί ποτε τὸ πλοῖον ἔξωθεν μὲν, ἂν τις ὠθῇ τῷ κοντῷ τὸν ἰστὸν ἢ τι ἄλλο προσβάλλον μόνον, κινεῖ ῥαδίως, ἐὰν δ' ἐν αὐτῷ τις

26 κινεῖται PΛ: κινεῖσθαι cett. 698^b1 αἰεὶ om. b₂Δ ἡ πρὸς ὃ α: ἡ πρόσω P: ἡ πρώτη N: ἡ πρώτη b₁V²T: om. b₂Δ ἢ ἡ α ἢ ἀρχή om. P 5 αὐτῷ b₂Γ: αὐτῷ b₁YVN: αὐτῷ E: αὐτοῖς P 6 ἐστὶ αΔ: ἔστι b₁ 8 αὐτοῖς P 14 τι om. Eb₂N 15 ὑπερδώσει Y: ὑπερδῶσει E²: εἰ ποδώσει S 16 ἐμύσει Diels: μυσι(ν) YVbMPΓΔ: ποσὶ E, Platt μυσὶν ante ἢ, τοῖς om. YVb₁ τῇ ante γῆ om. b₂ πορευομένοις post γῆ b₁, utrobique Y πηλῷ scripsi: τῇ γῆ libri: τῇ χεῖρ Fq. τοῖς ἐν τῇ γῇ ἢ secl. Platt 18 νεῦσις] πλεῦσις α ἀντερείδει O^db₂N 19 ἕτερον εἶναι τοῦτο b₂PN 21 ποτε om. b₂Γ 23 προσβάλλον b₁ ἐν' ἐπ' ab₁ τις ὦν om. b₂

when he is in the boat itself, he would never move
it—no, not even if he were Tityus, nor yet Boreas
blowing from *inside* the boat, if he blew in the way the
painters show him; for they paint him sending the
breath out from himself. For whether one blows the
air out gently, or violently, so as to make a very great
wind, and whether it is breath or something else that
one hurls or shoves, it is necessary, first of all, that one
support oneself against some resting part of oneself
when one pushes, and, further, that this part—either
itself or that of which it is a part—remain at rest by
fixing itself against something outside it. The man who
pushes the boat while he is himself standing in the boat
and fixing himself against the boat naturally does not
move it, since it is necessary that that against which he
fixes himself remain still. But in his case the thing he
tries to move and that against which he is fixing him-
self are the same. If, however, he pushes or pulls from
the boat.

- 3 Someone might pose this problem: if something moves
the whole heavens, must this, too, be unmoved and be
neither any part of the heavens, nor in the heavens?
For if it is moved itself and moves the heavens, it must
touch something that is unmoved in order to impart the
movement, and this must be no part of the mover; and
if the mover is unmoved from the first, it must, equally,
be no part of what is moved. And on this point, at least,
they are quite right who say that when the sphere is
borne in a circle no part at all remains still; for it would
be necessary either that the whole of it remain still, or
that its continuity be torn asunder. But they are not
right to ascribe power to the poles, which have no size
and are termini and points. For besides the fact that
nothing of this kind has any substance, it is impossible
for a simple motion to be imparted by what is two; and

ὦν τῷ πλοίῳ τοῦτο πειράται πράττειν, οὐκ ἂν κινήσειεν οὐδ'
ἂν ὁ Τίτυος οὐθ' ὁ Βορέας πνέων ἔσωθεν ἐκ τοῦ πλοίου, εἰ τύ-
χοι πνέων τὸν τρόπον τοῦτον ὅνπερ οἱ γραφεῖς ποιοῦσιν· ἐξ
αὐτοῦ γὰρ τὸ πνεῦμα ἀφιέντα γράφουσιν. ἐάν τε γὰρ ἡρέμα
ρίπτῃ τὸ πνεῦμα τις ἐάν τ' ἰσχυρῶς οὕτως ὥστ' ἄνεμον ποιεῖν
τὸν μέγιστον, ἐάν τε ἄλλο τι ἢ τὸ ῥιπτούμενον ἢ ὠθούμενον,
ἀνάγκη πρῶτον μὲν πρὸς ἡρεμοῦν τι τῶν αὐτοῦ μορίων ἀπε-
ρειδόμενον ὡθεῖν, εἴτα πάλιν τοῦτο τὸ μόριον, ἢ αὐτὸ ἢ οὐ
τυγχάνει μόριον ὄν, πρὸς τῶν ἐξωθέν τι ἀποστηριζόμενον μέ-
νειν. ὁ δὲ τὸ πλοῖον ὡθὼν ἐν τῷ πλοίῳ αὐτὸς ὦν καὶ ἀπο-
στηριζόμενος πρὸς τὸ πλοῖον εὐλόγως οὐ κινεῖ τὸ πλοῖον διὰ
τὸ ἀναγκαῖον εἶναι πρὸς ὃ ἀποστηρίζεται μένειν. συμβαίνει
δ' αὐτῷ τὸ αὐτὸ ὅ τε κινεῖ καὶ πρὸς ὃ ἀποστηρίζεται. ἔξω-
θεν δ' ὡθὼν ἢ ἔλκων κινεῖ· οὐθεν γὰρ μέρος ἢ γῆ τοῦ
πλοίου.

- 3 Ἀπορήσειε δ' ἂν τις, ἂρ' εἴ τι κινεῖ τὸν ὅλον οὐρανόν,
εἶναι τε δεῖ ἀκίνητον καὶ τοῦτο, (καὶ) μηθὲν εἶναι τοῦ οὐρανοῦ μόριον
μηδ' ἐν τῷ οὐρανῷ. εἴτε γὰρ αὐτὸ κινούμενον κινεῖ αὐτόν, ἀ-
νάγκη τινὸς ἀκινήτου θιγγάνον κινεῖν, καὶ τοῦτο μηδὲν εἶναι
μόριον τοῦ κινουίντος· εἴτ' εὐθὺς ἀκίνητόν ἐστι τὸ κινεῖν, ὁμοίως
οὐδὲν ἔσεσθαι τοῦ κινουμένου μόριον. καὶ τοῦτό γ' ὀρθῶς λέγουσιν
οἱ λέγοντες ὅτι κύκλῳ φερομένης τῆς σφαίρας οὐδ' ὅτιοῦν
μένει μόριον ἢ γὰρ ἂν ὅλην ἀναγκαῖον ᾗ μένειν, ἢ δια-
σπᾶσθαι τὸ συνεχὲς αὐτῆς. ἀλλ' ὅτι τοὺς πόλους οἴονται τινα
δύναμιν ἔχειν, οὐθεν ἔχοντας μέγεθος ἀλλ' ὄντας ἔσχατα
καὶ στιγμάς, οὐ καλῶς. πρὸς γὰρ τῷ μηδεμίαν οὐσίαν εἶναι
τῶν τοιούτων μηδενός, καὶ κινεῖσθαι τὴν μίαν κίνησιν ὑπὸ

24 οὐδ' Jaeger, A secutus: οὐτ' libri 25 Τίτυος] Κίρκιος Tor-
raca, Γ secutus 26 ὅνπερ] ὥσπερ b₂: ὄν P 27 αὐτοῦ
ΟΔΗΛΝΑ: αὐτοῦ EYSXPMPTA.M. 699^a13 τε δεῖ a: θέλει
bM¹Γ καὶ τοῦτο καὶ Fq.: καὶ τοῦτο ἀβM¹Γ: τοῦτο καὶ Forster
14 αὐτόν] αὐτό a 15 θιγγάνον κινεῖν bΓA: θιγγάνειν a 17
ἔσεσθαι libri, Γ: ἔσται A 19 ἂν om. bΓ 20 πολλοὺς b₁
26 καὶ om. b₂P, Platt αὐτῶν] αὐτῶν Platt

they make the poles two. From a consideration of problems such as these one might conclude that there is something that bears the same relation to the whole of nature that the earth does to animals and the things moved by them.

Now those who, in the manner of story-tellers, represent Atlas with his feet on the earth would seem to have a rational basis for their use of the fable. They describe him as a kind of radius, whirling the heavens around the poles. Now this would be quite reasonable, since the earth remains still. But if they give such an account they must concede that the earth is no part of the universe. Further, the forces of that which causes movement and of that which remains still must be made equal. For there is a certain amount of force and power in virtue of which what remains remains, just as there is of force in virtue of which the mover imparts motion. And there is a necessary proportion, just as of opposite motions, so also of states of rest. And equal forces are unaffected by one another, but they are overcome by a superiority of force. So Atlas, or anything similar that imparts movement from within, must exert a pressure no greater than the fixedness with which the earth remains stable, or the earth will be moved away from the center, out of its proper place. For just as the pusher pushes, so the pushed is pushed—i.e., with similar force. But that which imparts the motion starts out by being at rest, so that its force must be greater than, rather than similar and equal to, its own stability, and, similarly, greater than the stability of that which is moved but does not impart movement. Then the earth's power of stability will have to be as great as that of the whole heavens and that which moves them. And if this is impossible, it is also impossible that the heavens be moved by anything of this kind within them.

δυοῖν ἀδύνατον· τοὺς δὲ πόλους δύο ποιούσιν. ὅτι μὲν οὖν ἔχει
τι καὶ πρὸς τὴν ὅλην φύσιν οὕτως ὥσπερ ἡ γῆ πρὸς τὰ ζῷα
καὶ τὰ κινούμενα δι' αὐτῶν, ἐκ τῶν τοιούτων ἂν τις διαπορή-
σειεν.

Οἱ δὲ μυθικῶς τὸν Ἀτλαντα ποιούντες ἐπὶ τῆς γῆς
ἔχοντα τοὺς πόδας δόξαιεν ἂν ἀπὸ διανοίας εἰρηκῆναι τὸν
μῦθον, ὡς τοῦτον ὥσπερ διάμετρον ὄντα καὶ στρέφοντα τὸν
οὐρανὸν περὶ τοὺς πόλους· τοῦτο δ' ἂν συμβαίνοι κατὰ λόγον
διὰ τὸ τὴν γῆν μένειν. ἀλλὰ τοῖς ταῦτα λέγουσιν ἀναγκαῖον
φάναι μὴδὲν εἶναι μῶριον αὐτὴν τοῦ παντός. πρὸς δὲ
τούτοις δεῖ τὴν ἰσχὺν ἰσάζειν τοῦ κινούντος καὶ τὴν τοῦ μένοντος.
ἔστι γάρ τι πλῆθος ἰσχύος καὶ δυνάμεως καθ' ἣν μένει τὸ
μένον, ὥσπερ καὶ καθ' ἣν κινεῖ τὸ κινούν· καὶ ἔστι τις ἀνα-
λογία ἐξ ἀνάγκης, ὥσπερ τῶν ἐναντίων κινήσεων, οὕτω καὶ
τῶν ἡρεμιῶν. καὶ αἱ μὲν ἴσαι ἀπαθείς ὑπ' ἀλλήλων, κρα-
τοῦνται δὲ κατὰ τὴν ὑπεροχὴν. διόπερ εἴτ' Ἀτλας εἴτε τι
τοιούτων ἐστὶν ἕτερον τὸ κινούν τῶν ἐντός, οὐδὲν μᾶλλον ἀντερεί-
δειν δεῖ τῆς μονῆς ἣν ἡ γῆ τυγχάνει μένουσα· ἢ κινηθήσεται
ἡ γῆ ἀπὸ τοῦ μέσου καὶ ἐκ τοῦ αὐτῆς τόπου. ὥς γὰρ τὸ ὠ-
θεῖν ὠθεῖ, οὕτω τὸ ὠθούμενον ὠθεῖται, καὶ ὁμοίως κατ' ἰσχύν.
κινεῖ δὲ τὸ ἡρεμοῦν πρῶτον, ὥστε μᾶλλον καὶ πλείων ἢ ἰσχύς
ἢ ὁμοία καὶ ἴση τῆς ἡρεμίας. ὡσαύτως δὲ καὶ τῆς τοῦ κινου-
μένου μὲν, μὴ κινούντος δέ. τοσαύτην οὖν δεήσει τὴν δύναμιν
εἶναι τῆς γῆς ἐν τῇ ἡρεμίᾳ ὅσην ὁ τε πᾶς οὐρανὸς ἔχει καὶ
τὸ κινούν αὐτόν. εἰ δὲ τοῦτο ἀδύνατον, ἀδύνατον καὶ τὸ κινεῖ-
σθαι τὸν οὐρανὸν ὑπὸ τίνος τοιούτου τῶν ἐντός.

30 συμβαίνοι aΓ: συμβαίνη b καὶ ante κατὰ add. P 35 καὶ
ante καθ' om. a 699b2 ἕτερόν ἐστι b₁P 3 δεῖ om. b
4 μέσου] μένειν L 6 ἡ om. b₁ 7 καὶ τῆς b₁LH^aPM^a: καὶ
ἡ YVN: καὶ ἡ τῆς X: καὶ αἱ E καὶ τῆς . . . 8 δέ] ἡ τοῦ κινουμένου
(καὶ κινούντος τῆς τοῦ κινουμένου) μὲν μὴ κινούντος δέ Fq.

4 There is a problem about the motions of the parts of the universe that we might consider, as being closely connected to what we have just said. For if someone could overcome by power of motion the stability of the earth, it is clear that he would move it away from the center. And it is obvious that the force from which this power would derive is not infinite. For the earth is not infinite, so its weight is not either. Now "impossible" has several senses: for when we say it is impossible to see a sound and for us to see the men in the moon, we use two different senses of the word. The former is invisible of necessity; the latter, though of such a nature as to be visible, will not actually be seen. And we believe that the universe is imperishable and indestructible of necessity; but the result of this argument is that it is not so of necessity. For it is natural and possible for there to be a motion greater than that in virtue of which the earth remains stable, and in virtue of which fire and the body above are moved. If, then, there are overwhelming motions, these bodies will be destroyed by one another. And if there are not, but might possibly be (since there could *not* possibly be an *infinite* motion, because it is not even possible for a body to be infinite), it would be possible for the heavens to be dissolved. For what prevents this from happening, if it is not impossible? And it is not impossible unless the opposite is necessary. Let us, however, discuss this problem further another time.

Must there be something unmoved and at rest outside what is moved, and which is no part of it, or not? And must this necessarily hold true of the universe as well? For it looks as if it would be paradoxical if the origin of motion were inside. That is why, to those who see it this way, Homer's words would appear to be well spoken:

4 Ἔστι δέ τις ἀπορία περὶ τὰς κινήσεις τῶν τοῦ οὐρανοῦ μορίων, ἣν ὡς οὔσαν οἰκείαν τοῖς εἰρημένοις ἐπισκέψαιτ' ἂν τις. ἔαν γάρ τις ὑπερβάλλῃ τῇ δυνάμει τῆς κινήσεως τὴν τῆς γῆς ἡρεμίαν, δῆλον ὅτι κινήσει αὐτὴν ἀπὸ τοῦ μέσου. καὶ ἡ 15 ἰσχυρὸς δ' ἀφ' ἧς αὕτη ἡ δύναμις, ὅτι οὐκ ἄπειρος, φανερόν· οὐδὲ γὰρ ἡ γῆ ἄπειρος, ὥστ' οὐδὲ τὸ βάρος αὐτῆς. ἐπεὶ δὲ τὸ ἀδύνατον λέγεται πλεοναχῶς (οὐ γὰρ ὡσαύτως τὴν τε φωνὴν ἀδύνατόν φαμεν εἶναι ὁραθῆναι καὶ τοὺς ἐπὶ τῆς σελήνης ὑφ' ἡμῶν. τὸ μὲν γὰρ ἐξ ἀνάγκης, τὸ δὲ πεφυκὸς ὁρᾶσθαι οὐκ ὀφθῆσεται), τὸν δ' οὐρανὸν ἀφθαρτον εἶναι καὶ ἀδιάλυτον οἴομεθα μὲν ἐξ ἀνάγκης [εἶναι], συμβαίνει δὲ κατὰ τοῦτον τὸν λόγον οὐκ ἐξ ἀνάγκης· πέφυκε γὰρ καὶ ἐνδέχεται εἶναι κίνησιν μείζω καὶ ἀφ' ἧς ἡρεμεῖ ἡ γῆ καὶ ἀφ' ἧς κινούνται τὸ πῦρ καὶ τὸ ἄνω σῶμα. εἰ μὲν οὖν εἰσιν ὑπερέχουσαι κινήσεις, διαλυθήσεται ταῦτα ὑπ' ἀλλήλων. εἰ δὲ μὴ εἰσὶ μὲν, ἐνδέχεται δ' εἶναι (ἄπειρον γὰρ οὐκ ἐνδέχεται διὰ τὸ μηδὲ σῶμα ἐνδέχεσθαι ἄπειρον εἶναι), ἐνδέχοιτ' ἂν διαλυθῆναι τὸν οὐρανόν. τί γὰρ κωλύει τοῦτο συμβῆναι, εἴπερ μὴ ἀδύνατον; οὐκ ἀδύνατον δέ, εἰ μὴ τάντικείμενον ἀναγκαῖον. ἀλλὰ περὶ μὲν τῆς ἀπορίας ταύτης ἕτερος ἔστω λόγος.

Ἄρα δὲ δεῖ τι ἀκίνητον εἶναι καὶ ἡρεμοῦν ἔξω τοῦ κινουμένου, μηδὲν ὃν ἐκείνου μῶριον, ἢ οὐ; καὶ τοῦτο πότερον καὶ ἐπὶ τοῦ παντὸς οὕτως ὑπάρχειν ἀναγκαῖον; ἴσως γὰρ ἂν δόξειεν ἄτοπον εἶναι εἰ ἡ ἀρχὴ τῆς κινήσεως ἐντός. διὸ δόξειεν ἂν τοῖς οὕτως ὑπολαμβάνουσιν εὖ εἰρησθαι Ὀμήρῳ·

13 ὡς om. a 16 αὕτη S, O^d incertum 19 ἀδύνατόν φαμεν εἶναι aN: φαμεν ἀδύνατον b₂ εἶναι om. b₁b₂P 22 εἶναι del. Bonitz 25 ὑπερέχουσαι M^c: ὑπερβάλλουσai P: αἱ ὑπερέχουσai YVb₁b₂N: αἱ περιέχουσai E 28 μηδὲν P εἶναι om. P 31 ἔσται b₁ 32 τι ἀκίνητον bGM¹: ἀκίνητόν τι a

But you could not draw from the heavens to the ground

Zeus, loftiest of all, no, not even if you should struggle exceedingly, till you were weary. 700^a

Lay hold of the rope, all you gods and goddesses.

For what is wholly unmoved cannot possibly be moved by anything. Herein lies the solution of the problem we mentioned some time ago, the possibility or impossibility of the dissolution of the composition of the heavens, given that they depend on an unmoved origin. 5

But in the case of animals, there must be something unmoved not only in this sense, but also, within the actual creatures moving from place to place—those, that is, which move themselves—(since they must have one part at rest and one in motion), there must be something against which the moved part supports itself when it moves, as, for example, if it moves one of its limbs; for one part supports itself against another which is, so to speak, at rest. 10

But concerning lifeless things that are moved, one might wonder whether all have in themselves both that which is at rest and that which imparts movement, and whether they, too, must support themselves against something external which is at rest. Or is this impossible—as, for example, in the case of fire or earth or any other lifeless thing—and must it not rather be looked for in the things by which, in a primary way, these are moved? For all lifeless things are moved by something else, and the origin for all the things moved in this way is something that moves itself. Among things of this sort, we have spoken already about animals; for all things of this sort must have both something at rest in themselves, and something outside against which they will support themselves. But whether there is something higher, which imparts motion in a primary way, is unclear, and we will give a separate account of this sort of origin. At any rate, 15 20

ἀλλ' οὐκ ἂν ἐρύσαιτ' ἐξ οὐρανόθεν πεδίοιςδε
Ζῆν' ὑπατον πάντων, οὐδ' εἰ μάλα πολλὰ κάμωιτε· 700^a
πάντες δ' ἐξάπτεσθε θεοὶ πάσαι τε θείαιαι.

τὸ γὰρ ὅλως ἀκίνητον ὑπ' οὐδενὸς ἐνδέχεται κινηθῆναι. ὅθεν λύεται καὶ ἡ πάλαι λεχθεῖσα ἀπορία, πότερον ἐνδέχεται ἢ οὐκ ἐνδέχεται διαλυθῆναι τὴν τοῦ οὐρανοῦ σύστασιν, εἰ ἐξ ἀκινήτου ἡρτῆται ἀρχῆς. 5

Ἐπὶ δὲ τῶν ζώων οὐ μόνον τὸ οὕτως ἀκίνητον δεῖ ὑπάρχειν, ἀλλὰ καὶ ἐν αὐτοῖς τοῖς κινουμένοις κατὰ τὸπον ὅσα κινεῖ αὐτὰ αὐτὰ (δεῖ γὰρ αὐτῶν τὸ μὲν ἡρεμεῖν τὸ δὲ κινεῖσθαι), πρὸς ὃ ἀπεριδόμενον τὸ κινούμενον κινήσεται, οἷον ἂν τι κινή τῶν μορίων ἀπερίδεται γὰρ θάτερον ὡς πρὸς μένον θάτερον. 10

Περὶ δὲ τῶν ἀψύχων ὅσα κινεῖται ἀπορήσειεν ἂν τις, πότερον ἅπαντ' ἔχει ἐν ἑαυτοῖς καὶ τὸ ἡρεμοῦν καὶ τὸ κινεῖν, καὶ πρὸς τῶν ἔξω τι ἡρεμοῦντων ἀπεριδέσθαι ἀνάγκη καὶ ταῦτα, ἢ ἀδύνατον, οἷον πῦρ ἢ γῆν ἢ τῶν ἀψύχων τι, ἀλλ' ὑφ' ὧν ταῦτα κινεῖται πρώτων. πάντα γὰρ ὑπ' ἄλλου κινεῖται τὰ ἄψυχα, ἀρχὴ δὲ πάντων τῶν οὕτως κινουμένων τὰ αὐτὰ αὐτὰ κινεῖν. τῶν δὲ τοιούτων περὶ μὲν τῶν ζώων εἴρηται· τὰ γὰρ τοιαῦτα πάντα ἀνάγκη καὶ ἐν αὐτοῖς ἔχειν τὸ ἡρεμοῦν, καὶ ἔξω πρὸς ὃ ἀπερίσεται. εἰ δέ τι ἐστὶν ἀνωτέρω καὶ πρώτως κινεῖν, ἄδηλον, καὶ ἄλλος λόγος περὶ τῆς τοιαύτης ἀρχῆς. τὰ δὲ ζῶα 15 20

700^a1 πάντων *ab*₁ ΓΑ.Μ.: μήστορα πάντων PN: μήστορα *b*₂Δ, ex II.
Θ 22 (versus 21.22.20 transp. Aristoteles) 4 λύεται] δύεται aliquo
invenit M 7-10 recte distinxit Düring 8 αὐτὰ om. E αὐτῶν
*b*₂N: αὐτοῖς P: αὐτοῦ *ab*₁Γ 15 ἀλλ' *ab*₁*b*₂NM^cMP: ἀλλὰ P: ἀλλ'
Bekker, codd. ESY falso transcriptis 20 πρώτον κινεῖν *b*₁*b*₂N
εὐδηλον S

animals that move all move supported against something outside—even when they inhale and exhale. For there is no difference between hurling a large weight and a small one, as people do when they spit and cough and inhale and exhale.

5 But is it only in that which moves itself from place to place that something must remain still, or also in that which is the reason for its own alteration and growth? Now the question of original generation and decay is different. For if there is, as we hold, a primary motion, this would account for generation and decay, and, indeed, possibly for all other sorts of motion. Just as in the universe, so in the animal this is the primary motion in the completed creature; so that it (sc. the primary motion) is responsible for growth, if the creature becomes responsible for its own growth, and for alteration too. But otherwise (i.e., if there is not such a primary motion), the resting point will not be necessary. The first growth and alteration, however, take place by another's agency and through other means. And it is in no way possible for anything to be responsible for its own generation and decay. For the mover must preexist the moved, and the begetter the begotten. But nothing is prior to itself.

6 Now whether the soul is moved or not, and, if it is moved, how it is moved, has already been discussed in our work on the soul. Since all lifeless things are moved by something else, and since we have set forth in our work on first philosophy our views concerning how the first and eternally moved is moved, and how the first mover imparts motion, it remains for us to consider how the soul moves the body, and what is the origin of an animal's motion. For if we exclude the motion of the universe, living creatures are responsible for the motion of everything else, except such things as are

ὅσα κινεῖται, πάντα πρὸς τὰ ἔξω ἀπειριδόμενα κινεῖται, καὶ ἀναπνέοντα καὶ ἐκπνέοντα. οὐδὲν γὰρ διαφέρει μέγα ῥίψαι βάρος ἢ μικρόν, ὅπερ ποιοῦσιν οἱ πτύοντες καὶ βήττοντες καὶ οἱ εἰσπνέοντες καὶ ἐκπνέοντες.

25

5 Πότερον δ' ἐν τῷ αὐτῷ αὐτὸ κινεῖν κατὰ τόπον μόνῳ δεῖ τι μένειν, ἢ καὶ ἐν τῷ ἀλλοιούμενῳ αὐτῷ ὑφ' αὐτοῦ καὶ αὐξανόμενῳ; περὶ δὲ γενέσεως τῆς ἐξ ἀρχῆς καὶ φθορᾶς ἄλλος λόγος· εἰ γάρ ἐστιν ἥπερ φαμέν πρώτη κίνησις, γενέσεως καὶ φθορᾶς αὕτη αἰτία ἂν εἴη, καὶ τῶν ἄλλων δὴ κινήσεων ἴσως πασῶν. ὥσπερ δ' ἐν τῷ ὄλῳ, καὶ ἐν τῷ ζῷῳ κινήσεις πρώτη αὕτη, ὅταν τελεωθῇ ὥστε καὶ αὐξήσεως, εἴ ποτε γίνεται αὐτὸ αὐτῷ αἴτιον, καὶ ἀλλοιώσεως. εἰ δὲ μή, οὐκ ἀνάγκη. αἱ δὲ πρώται αὐξήσεις καὶ ἀλλοιώσεις ὑπ' ἄλλου γίνονται καὶ δι' ἐτέρων· γενέσεως δὲ καὶ φθορᾶς οὐδαμῶς οἷόν τε αὐτὸ αἴτιον εἶναι αὐτῷ οὐδέν. προϋπάρχειν γὰρ δεῖ τὸ κινεῖν τοῦ κινουμένου καὶ τὸ γενεῶν τοῦ γεννωμένου· αὐτὸ δ' αὐτοῦ πρότερον οὐδέν ἐστιν.

30

35

700^b

6 Περὶ μὲν οὖν ψυχῆς, εἴτε κινεῖται εἴτε μή, καὶ εἰ κινεῖται, πῶς κινεῖται, πρότερον εἴρηται ἐν τοῖς διωρισμένοις περὶ αὐτῆς. ἐπεὶ δὲ τὰ ἀψυχα πάντα κινεῖται ὑφ' ἐτέρου, περὶ δὲ τοῦ πρώτου κινουμένου καὶ αἰεὶ κινουμένου, τίνα τρόπον κινεῖται, καὶ πῶς κινεῖ τὸ πρῶτον κινεῖν, διώριται πρότερον ἐν τοῖς περὶ τῆς πρώτης φιλοσοφίας, λοιπὸν ἐστὶ θεωρηῖσαι πῶς ἡ ψυχὴ κινεῖ τὸ σῶμα, καὶ τίς ἀρχὴ τῆς τοῦ ζῴου κινήσεως. τῶν γὰρ ἄλλων παρὰ τὴν τοῦ ὅλου κίνησιν τὰ ἔμψυχα αἴτια τῆς κινήσεως, ὅσα μὴ κινεῖται ὑπ' ἀλλή-

10

24 καὶ οἱ βήσσοντες b_2P : καὶ οἱ βύσσοντες N 25 καὶ οἱ ἐκπνέοντες b_1 26 αὐτῷ αὐτὸ b_2 , cm. Jacg. suo ingenio: αὐτὸ αὐτὸ EVO⁴PN: αὐτὸ S: αὐτὸ YM¹ τι ante κινεῖν add. b_2 27 καὶ om. a αὐτῷ αὐτὸ EYP 28 ἐν αὐξανόμενῳ b_1 29 περ om. b_2 πρώτη κίνησις ab_1b_2 ΓΛ: πρώτην κίνησιν PM^c 30 αὕτη ἂν εἴη αἰτία H²L, corr. X δὴ Fq.: δὲ ab_1H^2XN : om. LP 33 γίνηται P: γένηται b_2N αὐτῷ αὐτῷ EY 35 ἄλλων Y 700^b3 ἐστὶν om. b_2PN 4 ἢ μή P 9 λοιπὸν δ' a 10 τίς ἢ ἀρχὴ P 11 ὅλου] λόγου a

moved by each other through striking against each other. Hence all their movements have a limit; for so do the motions of living creatures. For all animals both impart movement and are moved for the sake of something, so that this is the limit to all their movement: the thing for-the-sake-of-which. Now we see that the movers of the animal are reasoning and *phantasia* and choice and wish and appetite. And all of these can be reduced to thought and desire. For both *phantasia* and sense-perception hold the same place as thought, since all are concerned with making distinctions—though they differ from each other in ways we have discussed elsewhere. Wish and spiritedness and appetite are all desire, and choice shares both in reasoning and in desire. So that the first mover is the object of desire and also of thought; not, however, every object of thought, but the end in the sphere of things that can be done. So it is a good of this sort that imparts movement, not everything noble. For insofar as something else is done for the sake of this, and insofar as it is an end of things that are for the sake of something else, thus far it imparts movement. And we must suppose that the apparent good ranks as a good, and so does the pleasant (since it is an apparent good). So it is clear that the movement of the eternally moved by the eternal mover is in one respect similar to that of any animal, but in another respect dissimilar; hence the first is moved eternally, but the movement of animals has a limit. But the eternally noble and that which is truly and primarily good, and not good at one time but not at another, is too divine and too honorable to be relative to anything else. The first mover, then, imparts movement without being moved, and desire and the faculty of desire impart movement while being themselves moved. But it is not necessary for the last of the things that are moved to move anything. And from this it is obvious, too, that it is reasonable that movement from place to place is

λων διὰ τὸ προσκίπτειν ἀλλήλοις. διὸ καὶ πέρας ἔχουσιν αὐτῶν πᾶσαι αἱ κινήσεις· καὶ γὰρ καὶ αἱ τῶν ἐμψύχων. πάντα γὰρ τὰ ζῶα καὶ κινεῖται ἐνεκά τινος, ὥστε τοῦτ' ἔστιν αὐτοῖς πάσης τῆς κινήσεως πέρας, τὸ οὐ ἔνεκα. ὁρῶμεν δὲ τὰ κινούμενα τὸ ζῶον διάνοιαν καὶ φαντασίαν καὶ προαίρεσιν καὶ βούλησιν καὶ ἐπιθυμίαν. ταῦτα δὲ πάντα ἀνάγεται εἰς νοῦν καὶ ὄρεξιν. καὶ γὰρ ἡ φαντασία καὶ ἡ αἴσθησις τὴν αὐτὴν τῷ νῷ χώραν ἔχουσιν· κριτικὰ γὰρ πάντα, διαφέρουσι δὲ κατὰ τὰς εἰρημένας ἐν ἄλλοις διαφοράς. βούλησις δὲ καὶ θυμὸς καὶ ἐπιθυμία πάντα ὄρεξις, ἡ δὲ προαίρεσις κοινὸν διανοίας καὶ ὀρέξεως· ὥστε κινεῖ πρῶτον τὸ ὀρεκτὸν καὶ διανοητόν. οὐ πᾶν δὲ τὸ διανοητόν, ἀλλὰ τὸ τῶν πρακτῶν τέλος. διὸ τὸ τοιοῦτόν ἐστι τῶν ἀγαθῶν τὸ κινεῖν, ἀλλ' οὐ πᾶν τὸ καλόν· ἡ γὰρ ἔνεκα τούτου ἄλλο, καὶ ἡ τέλος ἐστὶ τῶν ἄλλου τινὸς ἔνεκα ὄντων, ταύτῃ κινεῖ. δεῖ δὲ τιθέναι καὶ τὸ φαινόμενον ἀγαθὸν ἀγαθοῦ χώραν ἔχειν, καὶ τὸ ἡδύ· φαινόμενον γὰρ ἐστὶν ἀγαθόν. ὥστε δηλὸν ὅτι ἐστὶ μὲν ἡ ὁμοίως κινεῖται τὸ αἰεὶ κινούμενον ὑπὸ τοῦ αἰεὶ κινούντος καὶ τῶν ζῴων ἕκαστον, ἔστι δ' ἡ ἄλλως, διὸ καὶ τὸ μὲν αἰεὶ κινεῖται, ἡ δὲ τῶν ζῴων κίνησις ἔχει πέρας. τὸ δὲ αἰδίδιον καλόν, καὶ τὸ ἀληθῶς καὶ πρῶτως ἀγαθὸν καὶ μὴ ποτὲ μὲν ποτὲ δὲ μὴ, θειότερον καὶ τιμώτερον ἢ ὥστ' εἶναι πρὸς ἕτερον. τὸ μὲν οὖν πρῶτον οὐ κινούμενον κινεῖ, ἡ δ' ὄρεξις καὶ τὸ ὀρεκτικὸν κινούμενον κινεῖ. τὸ δὲ τελευταῖον τῶν κινουμένων οὐκ ἀνάγκη κινεῖν οὐδέν. φανερόν δ' ἐκ τούτων καὶ ὅτι εὐλόγως ἡ φορὰ τελευταία τῶν κινήσεων ἐν τοῖς γινο-

14 καὶ γὰρ καὶ αἱ Eb₂N: καὶ γὰρ αἱ YVb₁PT 16 τῆς om. b₂
 17 καὶ αἴσθησιν post διάνοιαν add. b₂ 18 βούλησιν] βουλήν
 b₂N καὶ θυμὸν post βουλήν add. b₂ 20 ἔχει b₂PN 21
 διαφέρει b₂PN 22 ὄρεξις αλ: ὀρέξεις b 23–24 ὥστε κινεῖ
 πρῶτον τὸ ὀρεκτὸν καὶ διανοητόν P: quare movet primum quod appetibile et quod intellectuale Γ: ὥστε καὶ τὸ διανοητόν ab₁: ὥστε καὶ τὸ προαιρετόν b₂NAA.M. (τὸ om. N) προαιρετόν ante ἀλλὰ add. b₂NAA.M.
 25 τὸ post διὸ om. YVb₁P 28 ἀγαθοῦ . . . 29 ἀγαθόν om. a
 32 τὸ Fq.: τὰ libri 33 ἀληθῶς καὶ πρῶτως ab₁b₂NT: ἀληθές καὶ
 τὸ πρῶτως P 35 πρὸς ἕτερον PT: πρότερον ab₁b₂NMc: τι post
 πρότερον suppl. Jaeger, A secutus 701^a2 καὶ ὅτι] διότι b₂PN 3
 κινήσεων scripsi: κινουμένων P: γινομένων cett. γινομένοις] κινουμένοις Jaeg.

the last of the movements in things subject to becoming. For the animal moves and progresses in virtue of desire or choice, when some alteration has taken place in accordance with sense-perception or *phantasia*.

- 7 But how does it happen that thinking is sometimes accompanied by action and sometimes not, sometimes by motion, and sometimes not? It looks as if almost the same thing happens as in the case of reasoning and making inferences about unchanging objects. But in that case the end is a speculative proposition (for whenever one thinks the two premises, one thinks and puts together the conclusion), whereas here the conclusion which results from the two premises is the action. For example, whenever someone thinks that every man should take walks, and that he is a man, at once he takes a walk. Or if he thinks that no man should take a walk now, and that he is a man, at once he remains at rest. And he does both of these things, if nothing prevents or compels him. I should make something good; a house is something good. At once he makes a house. I need covering; a cloak is a covering. I need a cloak. What I need, I have to make; I need a cloak. I have to make a cloak. And the conclusion, the "I have to make a cloak," is an action. And he acts from a starting-point. If there is to be a cloak, there must necessarily be this first, and if this, this. And this he does at once. Now, that the action is the conclusion, is clear. And as for the premises of action, they are of two kinds—through the good and through the possible.

But as sometimes happens when we ask dialectical questions, so here reason does not stop and consider at all the second of the two premises, the obvious one. For example, if taking walks is good for a man, it does not waste time considering that he is a man. Hence whatever we do without calculating, we do quickly. For whenever a creature is actually using sense-percep-

μένους· κινεῖται γὰρ καὶ πορεύεται τὸ ζῶον ὁρέξει ἢ προ-
αιρέσει, ἀλλοιωθέντος τινὸς κατὰ τὴν αἴσθησιν ἢ τὴν φαν- 5
τασίαν.

- 7 Πῶς δὲ νοῶν ὅτε μὲν πράττει ὅτε δ' οὐ πράττει, καὶ
κινεῖται, ὅτε δ' οὐ κινεῖται; ἔοικε παραπλησίως συμβαίνειν
καὶ περὶ τῶν ἀκινήτων διανοουμένοις καὶ συλλογιζομένοις.
ἀλλ' ἐκεῖ μὲν θεωρήμα τὸ τέλος (ὅταν γὰρ τὰς δύο προ- 10
τάσεις νοήσῃ, τὸ συμπέρασμα ἐνόησε καὶ συνέθηκεν), ἐν-
ταῦθα δ' ἐκ τῶν δύο προτάσεων τὸ συμπέρασμα γίνεται ἢ
πρᾶξις, οἷον ὅταν νοήσῃ ὅτι παντὶ βαδιστέον ἀνθρώπῳ, αὐτὸς
δ' ἄνθρωπος, βαδίζει εὐθέως, ἂν δ' ὅτι οὐδενὶ βαδιστέον νῦν
ἀνθρώπῳ, αὐτὸς δ' ἄνθρωπος, εὐθὺς ἡρεμεῖ. καὶ ταῦτα 15
ἅμφω πράττει, ἂν μὴ τι κωλύῃ ἢ ἀναγκάζῃ. ποιητέον
μοι ἀγαθόν, οἰκία δ' ἀγαθόν· ποιεῖ οἰκίαν εὐθύς. σκεπά-
σματος δέομαι, ἱμάτιον δὲ σκέπασμα· ἱματίου δέομαι. οὐ
δέομαι, ποιητέον ἱματίου δέομαι ἱμάτιον ποιητέον. καὶ τὸ
συμπέρασμα, τὸ ἱμάτιον ποιητέον, πρᾶξις ἐστίν. πράττει 20
δ' ἀπ' ἀρχῆς. εἰ ἱμάτιον ἔσται, ἀνάγκη εἶναι τότε πρῶτον, εἰ
δὲ τότε, τότε· καὶ τοῦτο πράττει εὐθύς. ὅτι μὲν οὖν ἡ πρᾶ-
ξις τὸ συμπέρασμα, φανερόν· αἱ δὲ προτάσεις αἱ ποιητι-
καὶ διὰ δύο εἰδῶν γίνονται, διὰ τε τοῦ ἀγαθοῦ καὶ διὰ τοῦ
δυνατοῦ.

25 Ὡς περὶ δὲ τῶν ἐρωτώντων ἔνιοι, οὕτω τὴν ἐτέραν πρό-
τασιν τὴν δῆλην οὐδ' ἡ διάνοια ἐφιστάσα σκοπεῖ οὐδέν· οἷον εἰ
τὸ βαδίζειν ἀγαθὸν ἀνθρώπῳ, ὅτι αὐτὸς ἄνθρωπος, οὐκ ἐν-
διατρίβει. διὸ καὶ ὅσα μὴ λογισάμενοι πράττομεν, ταχὺ
πράττομεν. ὅταν ἐνεργήσῃ γὰρ ἡ τῇ αἰσθήσει πρὸς τὸ οὐ

7 νοῶν] νῦν a 12 ἢ om. Yb₂MP 13 ὅταν νοήσῃ om. b₂
19 ἱματίον ποιεῖ ab₁ 21 εἶναι om. ab₁Γ 22 τότε καὶ
τότε πράττει εὐθύς a: hoc et hoc, et hoc operatur statim Γ, sim. Δ
24 διὰ post καὶ om. Vb₂PN

tion or *phantasia* or thought towards the thing for-the-
sake-of-which, he does at once what he desires. For
the activity of the desire takes the place of questioning
or thinking. "I have to drink," says appetite. "Here's
drink," says sense-perception or *phantasia* or thought.
At once he drinks. This, then, is the way that animals
are impelled to move and act: the proximate reason
for movement is desire, and this comes to be either
through sense-perception or through *phantasia* and
thought. With creatures that desire to act, it is some-
times from appetite or spiritedness and sometimes from
[desire or] wish that they make or act.

The movement of animals is like that of automatic
puppets, which are set moving when a small motion
occurs: the cables are released and the pegs strike
against one another; and like that of the little cart (for
the child riding in it pushes it straight forward, and yet
it moves in a circle because it has wheels of unequal
size: for the smaller acts like a center, as happens in
the case of the cylinders). For they have functioning
parts that are of the same kind: the sinews and bones.
The latter are like the pegs and the iron in our example,
the sinews like the cables. When these are released and
slackened the creature moves. Now in the puppets and
carts no alteration takes place, since if the inner wheels
were to become smaller and again larger, the movement
would still be circular. But in the animal the same part
has the capacity to become both larger and smaller and
to change its shape, as the parts expand because of heat
and contract again because of cold, and alter. Alteration
is caused by *phantasiai* and sense-perceptions and ideas.
For sense-perceptions are at once a kind of alteration
and *phantasia* and thinking have the power of the actual
things. For it turns out that the form conceived of the
[warm or cold or] pleasant or fearful is like the actual
thing itself. That is why we shudder and are frightened
just thinking of something. All these are affections and
alterations; and when bodily parts are altered some

ἐνεκα ἢ τῇ φαντασίᾳ ἢ τῷ νῷ, οὐ ὁρέγεται, εὐθὺς ποιεῖ. 30
ἀντ' ἐρωτήσεως γὰρ ἢ νοήσεως ἢ τῆς ὁρέξεως γίνεται ἐνέρ-
γεια. ποτέον μοι, ἢ ἐπιθυμία λέγει· τοδὶ δὲ ποτόν, ἢ αἰ-
σθησις εἶπεν ἢ ἡ φαντασία ἢ ὁ νοῦς· εὐθὺς πίνει. οὕτως μὲν
οὖν ἐπὶ τὸ κινεῖσθαι καὶ πράττειν τὰ ζῷα ὁρμῶσι, τῆς μὲν
ἐσχάτης αἰτίας τῆς κινήσεως ὁρέξεως οὔσης, ταύτης δὲ γινο- 35
μένης ἢ δι' αἰσθήσεως ἢ διὰ φαντασίας καὶ νοήσεως. τῶν
δ' ὁρεγομένων πράττειν τὰ μὲν δι' ἐπιθυμίαν ἢ θυμὸν τὰ δὲ
δι(ὰ) [ὄρεξιν ἢ] βούλησιν τὰ μὲν ποιοῦσι τὰ δὲ πράττουσι. 701^b

Ὡς περ δὲ τὰ αὐτόματα κινεῖται μικρὰς κινήσεως γενομένης,
λυομένων τῶν στρεβλῶν καὶ κρουόντων ἄλληλα τῶν ξύλων,
καὶ τὸ ἀμάξιον (ὃ γὰρ ὀχούμενος αὐτὸ κινεῖ εἰς εὐθύ, καὶ
πάλιν κύκλῳ κινεῖται τῷ ἀνίσους ἔχειν τοὺς τρόχους· ὃ γὰρ 5
ἐλάττων ὥσπερ κέντρον γίνεται, καθάπερ ἐν τοῖς κυλίνδροις),
οὕτω καὶ τὰ ζῷα κινεῖται. ἔχει γὰρ ὄργανα τοιαῦτα τὴν τε
τῶν νεύρων φύσιν καὶ τὴν τῶν ὀστέων, τὰ μὲν ὡς ἐκεῖ τὰ
ξύλα καὶ ὁ σίδηρος, τὰ δὲ νεῦρα ὡς αἱ στρέβλαι· ὧν λυο-
μένων καὶ ἀνιεμένων κινεῖνται. ἐν μὲν οὖν τοῖς αὐτομάτοις 10
καὶ τοῖς ἀμαξίοις οὐκ ἔστιν ἀλλοιώσεις, ἐπεὶ εἰ ἐγίγνοντο ἐλάτ-
τους οἱ ἐντὸς τροχοὶ καὶ πάλιν μείζους, κἂν κύκλῳ τὸ αὐτὸ
ἐκινεῖτο· ἐν δὲ τῷ ζῷῳ δύναται τὸ αὐτὸ καὶ μείζον καὶ
ἐλάττων γίνεσθαι καὶ τὰ σχήματα μεταβάλλειν, αὐξανο-
μένων τῶν μορίων διὰ θερμότητα καὶ πάλιν συστελλομένων 15
διὰ ψύξιν καὶ ἀλλοιουμένων. ἀλλοιοῦσι δ' αἱ φαντασίαι καὶ
αἱ αἰσθήσεις καὶ αἱ ἔννοιαι. αἱ μὲν γὰρ αἰσθήσεις εὐθὺς
ὑπάρχουσιν ἀλλοιώσεις τινὲς οὔσαι, ἡ δὲ φαντασία καὶ ἡ
νόησις τὴν τῶν πραγμάτων ἔχουσι δύναμιν τρόπον γὰρ τινα
τὸ εἶδος τὸ νοούμενον τὸ τοῦ [θερμοῦ ἢ ψυχροῦ ἢ] ἡδέος ἢ φοβε- 20
ροῦ τοιοῦτον τυγχάνει ὃν οἶόν περ καὶ τῶν πραγμάτων ἔκα-
στον, διὸ καὶ φρίττουσι καὶ φοβοῦνται νοήσαντες μόνον. ταῦ-
τα δὲ πάντα πάθη καὶ ἀλλοιώσεις εἰσὶν. ἀλλοιουμένων δ'

32 ποτέον YH^aL: ποτόν Vb,XPNT: ποτόν E 36 ἡ φαντασίας
ἢ νοήσεως b₂ 701^b1 ὄρεξιν ἢ seclusi 2 γενομένης ab₁: γινομένης
b₂PM¹ 3 ἄλληλα τῶν ξύλων scripsi: ἀλλήλας τὰς στρέβλας codd.
κρουουσῶν ἀλλήλας, secl. τὰς στρέβλας Forster, A secutus: κρουόντων
ἄλληλα, secl. τὰς στρέβλας Torraca λυομένων τῶν ξύλων καὶ κρουόντων
ἀλλήλαις τὰς στρέβλας Fq. 4 ὃ γὰρ ὀχούμενος Fq., Richards,
Ross: ὥσπερ ὀχούμενος b₁: ὅπερ ὀχούμενον ab₂NTM^c: ὥσπερ ὀχούμε-
νον P 9 λυομένων] συστελλομένων Fq. 12 τὸ αὐτό] ταῦτό P:
τὸ αὐτῷ E: τὸ αὐτό c τῷ αὐτῷ corr. Y 13 ἔλαττον καὶ μείζον b₁
15 καὶ πάλιν συστελλομένων διὰ] καὶ πνεῦμα καὶ aΓ 19 ἔχει
b₂N 20 θερμοῦ ἢ ψυχροῦ ἢ seclusi 21 ὧν om. b 22 καὶ
post διὸ om. b₂P μόνον om. a

become larger, some smaller. It is not difficult to see that a small change occurring in an origin sets up great and numerous differences at a distance—just as, if the rudder shifts a hair's breadth, the shift in the prow is considerable. Further, when, under the influence of heat or cold or some other similar affection, an alteration is produced in the region of the heart, even if it is only in an imperceptibly small part of it, it produces a considerable difference in the body, causing blushing and pallor, as well as shuddering, trembling, and their opposites.

- 8 Now the origin of motion is, as we have said, the object of pursuit or avoidance in the sphere of action. Of necessity the thought and *phantasia* of these are accompanied by heating and chilling. For the painful is avoided and the pleasant pursued, and (the thought and *phantasia* of) the painful and the pleasant are nearly always accompanied by chilling and heating (although we do not notice this when it happens in a small part). This is clear from the passions. For feelings of confidence, fears, sexual excitement, and other bodily affections, painful and pleasant, are accompanied by heating or chilling, in some cases of a part, in others of the whole body. Memory and anticipation, using things of this kind as likenesses, are now to a lesser degree, now to a greater, responsible for the same things. Hence it is with good reason that the inner regions and those around the origins of the organic members are fashioned as they are, so as to change from solid to liquid and from liquid to solid, from soft to hard and *vice versa*. Since these processes happen this way, and since the passive and active have the nature which we have often ascribed to them, then whenever it happens that there are both active and passive elements, and neither falls short in any respect of the account we give of them, at once one acts and the other is acted upon. That is why it is pretty much at the same time that the creature thinks it should move forward and moves,

ἐν τῷ σώματι τὰ μὲν μείζω τὰ δ' ἐλάττω γίνεται. ὅτι δὲ μικρὰ μεταβολὴ γινομένη ἐν ἀρχῇ μεγάλας καὶ πολλὰς ποιεῖ διαφορὰς ἀποθεν, οὐκ ἄδηλον· οἷον τοῦ οἴακος ἀκαριαῖόν τι μεθισταμένου πολλὴ ἢ τῆς πρῶρας γίνεται μετὰστασις. ἔτι δὲ κατὰ θερμότητα ἢ ψύξιν ἢ κατ' ἄλλο τι τοιοῦτον πάθος ὅταν γένηται ἀλλοιώσις περὶ τὴν καρδίαν, εἰ καὶ ἐν ταύτῃ κατὰ μέγεθος ἐν ἀναισθήτῃ μορίῳ, πολλὴν ποιεῖ τοῦ σώματος διαφορὰν ἐρυθρήμασι καὶ ὤχρότησι, καὶ φρίκαις καὶ τρόμοις καὶ τοῖς τούτων ἐναντίοις.

- 8 Ἀρχὴ μὲν οὖν, ὥσπερ εἴρηται, τῆς κινήσεως τὸ ἐν τῷ πρακτῷ διωκτὸν καὶ φευκτὸν ἐξ ἀνάγκης δ' ἀκολουθεῖ τῇ νοήσει καὶ τῇ φαντασίᾳ αὐτῶν θερμότης καὶ ψύξις. τὸ μὲν γὰρ λυπηρὸν φευκτὸν, τὸ δ' ἡδὺ διωκτὸν [ἀλλὰ λανθάνει περὶ τὰ μικρὰ τοῦτο συμβαῖνον], ἔστι δὲ τὰ λυπηρὰ καὶ ἡδέα πάντα σχεδὸν μετὰ ψύξεώς τινος καὶ θερμότητος ((ἀλλὰ λανθάνει περὶ τὰ μικρὰ τοῦτο συμβαῖνον)). τοῦτο δὲ δῆλον ἐκ τῶν παθημάτων. θάρρη γὰρ καὶ φόβοι καὶ ἀφροδισιασμοὶ καὶ τᾶλλα τὰ σωματικὰ λυπηρὰ καὶ ἡδέα τὰ μὲν κατὰ μῶριον μετὰ θερμότητος ἢ ψύξεως ἔστι, τὰ δὲ καθ' ὅλον τὸ σῶμα μῆναι δὲ καὶ ἐλπίδες, οἷον εἰδώλοισι χρώμεναι τοῖς τοιούτοις, ὅτε μὲν ἦττον ὅτε δὲ μᾶλλον αἰτίαι τῶν αὐτῶν εἰσιν. ὥστ' εὐλόγως ἤδη δημιουργεῖται τὰ ἐντὸς καὶ τὰ περὶ τὰς ἀρχὰς τῶν ὀργανικῶν μορίων μεταβάλλοντα ἐκ πεπηγότων ὑγρὰ καὶ ἐξ ὑγρῶν πεπηγότα καὶ μαλακὰ καὶ σκληρὰ ἐξ ἀλλήλων. τούτων δὲ συμβαινόντων τὸν τρόπον τοῦτον, καὶ ἔτι τοῦ παθητικοῦ καὶ ποιητικοῦ τοιαύτην ἐχόντων τὴν φύσιν οἷαν πολλαχοῦ εἰρήκαμεν, ὅποταν συμβῇ ὥστ' εἶναι τὸ μὲν ποιητικὸν τὸ δὲ παθητικόν, καὶ μηδὲν ἀπολίπη αὐτῶν ἐκάτερον τῶν ἐν τῷ λόγῳ, εὐθὺς τὸ μὲν ποιεῖ τὸ δὲ πάσχει. διὰ τοῦτο δ' ἅμα ὡς εἰπεῖν νοεῖ ὅτι πορευτέον καὶ πορεύεται, ἂν μὴ τι ἐμ-

26 ποιεῖ τὰς b_1 27 ἢ om. b_2 N 30 εἰ καὶ b_2 NA: καὶ cett. ἐν ταύτῃ] ἐκ ταύτης Platt ἐν post μέγεθος om. E in sensibili parte Γ 36 ἀλλὰ . . . συμβαῖνον post θερμότητος 702^a 1 transp. Moraux 702^a 9 ἐξ ὑγρῶν] ἐκ ξηρῶν b_2

unless something else impedes it. For the affections suitably prepare the organic parts, desire the affections, and *phantasia* the desire; and *phantasia* comes about either through thought or through sense-perception. The rapidity and simultaneity result from the fact that the active and passive are naturally relative to each other.

That which first moves the animal must necessarily be in some origin. We have said that a joint is the origin for one part and the end of the other; hence nature uses it sometimes as one, sometimes as two. For whenever movement starts from there, one of the endpoints must necessarily remain at rest, and the other be moved—for we have said already that the mover must support itself against something at rest. Accordingly, the extremity of the forearm is moved without imparting movement, while in the elbow-joint the one part, which lies in the whole segment that is being moved, is moved, but there must also be something unmoved; which is what we mean by saying that it is potentially one point, but becomes actually two. So if the forearm were the animal, somewhere in this joint would be the movement-imparting origin of the soul (i.e. of the living creature's activities).

But since it is possible for some lifeless thing to have this same relation to the hand, as, for example, if someone should move a staff in his hand, it is clear that the soul would not be in either of the endpoints—neither in the endpoint of what is moved, nor in the other origin (for the stick has both an origin and an endpoint with reference to the hand). So for this reason, if the movement-imparting origin from the soul is not also in the staff, it is not in the hand either. For the extremity of the hand stands in the same relation to the wrist (sc. as the stick does to the endpoint in the hand), and so does this part to the elbow. It makes no difference whether the part is attached to the body by growth or not; the

ποδίξῃ ἕτερον. τὰ μὲν γὰρ ὀργανικὰ μέρη παρασκευάζει ἐπιτηδείως τὰ πάθη, ἢ δ' ὄρεξις τὰ πάθη, τὴν δ' ὄρεξιν ἢ φαντασία· αὕτη δὲ γίνεται ἢ διὰ νοήσεως ἢ δι' αἰσθήσεως. ἅμα δὲ καὶ ταχὺ διὰ τὸ τὸ ποιητικὸν καὶ παθητικὸν τῶν πρὸς ἀλλήλα εἶναι τὴν φύσιν.

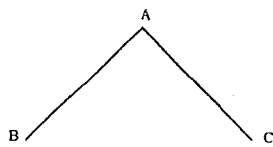
Τὸ δὲ κινεῖν πρῶτον τὸ ζῶον ἀνάγκη εἶναι ἐν τινι ἀρχῇ. ἢ δὲ καμπὴ ὅτι τοῦ μὲν ἐστὶ ἀρχὴ τοῦ δὲ τελευταίᾳ, εἴρηται. διὸ καὶ ἐστὶ μὲν ὡς ἐνί, ἐστὶ δ' ὡς δυοὶ χρήται ἢ φύσις αὐτῇ. ὅταν γὰρ κινῆται ἐντεῦθεν, ἀνάγκη τὸ μὲν ἡρεμεῖν τῶν σημείων τῶν ἐσχάτων, τὸ δὲ κινεῖσθαι· ὅτι γὰρ πρὸς ἡρεμοῦν δεῖ ἀπερείδεσθαι τὸ κινεῖν, εἴρηται πρότερον. κινεῖται μὲν οὖν καὶ οὐ κινεῖ τὸ ἐσχάτον τοῦ βραχίονος, τῆς δ' ἐν τῷ ὠλεκράνῳ κάμψεως τὸ μὲν κινεῖται τὸ ἐν αὐτῷ τῷ ὅλῳ κινουμένῳ, ἀνάγκη δ' εἶναι τι καὶ ἀκίνητον, ὃ δὴ φαμεν δυνάμει μὲν ἐν εἶναι σημεῖον, ἐνεργείᾳ δὲ γίνεσθαι δύο· ὥστ' εἰ τὸ ζῶον ἦν ὁ βραχίον, ἐνταῦθ' ἂν πού ἦν ἡ ἀρχὴ τῆς ψυχῆς ἢ κινούσα.

Ἐπεὶ δ' ἐνδέχεται καὶ πρὸς τὴν χεῖρα ἔχειν τι οὕτως τῶν ἀψύχων, οἷον εἰ κινεῖται τις βακτηρίαν ἐν τῇ χειρὶ, φανερόν ὅτι οὐκ ἂν εἴη ἐν οὐδετέρῳ ἢ ψυχῇ τῶν ἐσχάτων, οὐτ' ἐν τῷ ἐσχάτῳ τοῦ κινουμένου οὐτ' ἐν τῇ ἐτέρᾳ ἀρχῇ. καὶ γὰρ τὸ ξύλον ἔχει καὶ ἀρχὴν καὶ τέλος πρὸς τὴν χεῖρα. ὥστε διὰ γε τοῦτο, εἰ μὴ καὶ ἐν τῇ βακτηρίᾳ ἢ κινούσα ἀπὸ τῆς ψυχῆς ἀρχὴ ἐνεστί, οὐδ' ἐν τῇ χειρὶ· ὁμοίως γὰρ ἔχει καὶ τὸ ἄκρον τῆς χειρὸς πρὸς τὸν καρπὸν, καὶ τοῦτο τὸ μέρος πρὸς τὸ ὠλέκρανον. οὐδὲν γὰρ διαφέρει τὰ προσπεφυκότα τῶν μή· γίνεται γὰρ ὥσπερ

20 διὰ τὸ τὸ b_2N , cm. suo ingenio Bz: διὰ τὸ cett. 22 τοῦ μὲν ἐστὶν ἀρχὴ YV: μὲν ἐστὶ ἀρχὴ E: μὲν ἐστὶ τοῦ μὲν ἀρχὴ $\delta\Gamma M^p$ 29 κινεῖται] κινεῖται καὶ κινεῖ P: κινεῖ καὶ κινεῖται $\Gamma A.M.$ ἀλλ' ἀνάγκη b_1 30 δὴ om. b_1 31 ὁ om. $aO^d b_2$ 32 ἢ post ψυχῆς om. a 34 κινεῖται τις Fq: κινεῖται τὴν codd. 702^b1 καὶ post μὴ om. EY 2 ἐστὶν P

staff is like a separable limb. So the soul must not be in any origin that is the end of something else, not even if there is something else more external than that—as, e.g., the origin of the extremity of the stick is in the hand, and that of the extremity of the hand in the wrist. And if it is not even in the hand, because it is still higher up, neither is the origin in this higher place: for while the elbow remains at rest, all below it is moved as a continuous whole.

- 9 Since the left and right sides are similarly formed, and these opposites can be moved simultaneously, so that it is impossible for the left to be moved in virtue of the right's remaining at rest, and *vice versa*, and since (sc. in virtue of the preceding argument) the origin is always in something higher than both, the origin of the movement-imparting soul must necessarily be in the middle. For of both extremes the middle is the limit. And it is similarly related to motions from above and below—e.g., those from the head—and also to those proceeding from the spine in creatures which have a spine. And it is reasonable that this should be so: for we say that the faculty of sense-perception, too, is there. So that when, because of sense-perception, the area around the origin is altered and changes, the adjacent parts change also, expanding and contracting, so that by these means animal motion necessarily comes about. And the middle section of the body is potentially one, but of necessity becomes more than one in actuality. For the limbs can be set in motion simultaneously from the origin, and while one is at rest the other is in motion. Suppose, for example, that in the figure ABC B is moved, and A imparts movement. But there must, however, be something at rest, if one is to be moved and the other to impart movement. Then A, though



ἀφαιρετὸν μέρος ἢ βακτηρία. ἀνάγκη ἄρα ἐν μηδεμῇ εἶναι ἀρχὴν ἢ ἔστιν ἄλλου τελευτῇ, μηδὲ εἴ τί ἐστιν ἕτερον ἐκείνου ἐξωτέρω, οἷον τοῦ μὲν τῆς βακτηρίας ἐσχατοῦ ἐν τῇ χειρὶ ἢ ἀρχῇ, τούτου δ' ἐν τῷ καρπῷ. εἰ δὲ μηδ' ἐν τῇ χειρὶ, ὅτι ἀνωτέρω ἔτι, ἢ ἀρχὴ οὐδ' ἐνταῦθα ἔτι γὰρ τοῦ ὠλεκράνου μένοντος κινεῖται ἅπαν τὸ κάτω συνεχές.

- 9 Ἐπεὶ δ' ὁμοίως ἔχει ἀπὸ τῶν ἀριστερῶν καὶ ἀπὸ τῶν δεξιῶν, καὶ ἅμα τὰναντία κινεῖται, ὥστε μὴ εἶναι τῷ ἡρεμῇ τὸ δεξιὸν κινεῖσθαι τὸ ἀριστερὸν μηδ' αὐτῷ τῷ αὐτὸ ἐκείνο, αἰεὶ δ' ἐν τῷ ἀνωτέρω ἀμφοτέρων ἢ ἀρχῇ, ἀνάγκη ἐν τῷ μέσῳ εἶναι τὴν ἀρχὴν τῆς ψυχῆς τῆς κινούσης· ἀμφοτέρων γὰρ τῶν ἄκρων τὸ μέσον ἐσχατον. ὁμοίως δ' ἔχει πρὸς τὰς κινήσεις τοῦτο καὶ τὰς ἀπὸ τοῦ ἄνω καὶ κάτω, οἷον τὰς ἀπὸ τῆς κεφαλῆς, καὶ πρὸς τὰς ἀπὸ τῆς ῥάχews τοῖς ἔχουσι ῥάχιν. καὶ εὐλόγως δὲ τοῦτο συμβέβηκεν· καὶ γὰρ τὸ αἰσθητικὸν ἐνταῦθα εἶναι φαμεν, ὥστ' ἀλλοιούμενον διὰ τὴν αἰσθησιν τοῦ τύπου τοῦ περὶ τὴν ἀρχὴν καὶ μεταβάλλοντος τὰ ἐχόμενα συμμεταβάλλει ἐκτεινόμενά τε καὶ συναγόμενα τὰ μόρια, ὥστ' ἐξ ἀνάγκης διὰ ταῦτα γίνεσθαι τὴν κίνησιν τοῖς ζῴοις. τὸ δὲ μέσον τοῦ σώματος μέρος δυνάμει μὲν ἓν, ἐνεργείᾳ δ' ἀνάγκη γίνεσθαι πλείω καὶ γὰρ ἅμα κινεῖται τὰ κῶλα ἀπὸ τῆς ἀρχῆς, καὶ θατέρου ἡρεμοῦντος θάτερον κινεῖται. λέγω δ' οἷον ἐπὶ τῆς ΑΒΓ τὸ Β κινεῖται, κινεῖ δὲ τὸ Α. ἀλλὰ μὴν δεῖ γέ τι ἡρεμεῖν, εἰ μέλλει τὸ μὲν κινεῖσθαι τὸ δὲ κινεῖν. ἐν ἄρα δυνάμει ὃν τὸ Α ἐνεργείᾳ δύο

14 μηδ' αὐτῷ Οἰδῆς PM^c AA.M.: μηδ' αὐτῷ aS 15 ἢ om. EY, corr. V 17 πρὸς (ταύτας) τὰς Platt 18 καὶ κάτω om. Γ, secl. Fq., Torracca, sed habent Alex. Aphr. DA 96,26-27, Themistius In DA 121,9 19 καὶ πρὸς X (Fq. suo ingenio): καὶ N (Forster s.i.): πρὸς cett. τὰς bM^c Γ: τὰ a 23 συμμεταβάλλειν EY 29 μέλλοι Yb₁ 30 κινήσεσθαι Yb₁ δ₂ τὸ δὲ ἡρεμεῖν N ὃν τὸ Α aP: ὃν τὸ Β V: ὄντα τὰ ΑΒ V² b₁ H^a: ὄντα τὰ ΑΕ XLNM^c

potentially one, becomes two in actuality, so that it must be not a point but some magnitude. Again, C may be moved simultaneously with B, so that both of the origins in A must of necessity impart movement while being moved. Then there must be something else besides these that imparts motion but is not moved. Otherwise the extremities or origins in A would support themselves against each other when movement takes place, just like men who stand back to back and move their legs. There must be some one thing that moves them both, and this is the soul, which is distinct from a spatial magnitude of this kind, though it is in it.

- 10 According to the account that gives the reason for motion, desire is the middle, which imparts movement being moved. But in living bodies there must be some body of this kind. Now that which is moved but does not by nature initiate movement can be affected by an external power, but a mover must of necessity have some power and strength. It is clear that all animals have connate *pneuma* and derive their strength from this. (How the connate *pneuma* is maintained we have explained elsewhere.) This seems to bear a relation to the origin of life-activities that is similar to that which the point in the joints, the one which imparts movement and is moved, has to the unmoved. And since the origin is for some animals situated in the heart, for some in an analogous part, it is clear that the connate *pneuma* is also there. (Whether the *pneuma* is always the same or is always changing must be discussed elsewhere, for the same question arises about the other parts as well.) And it is obviously well disposed by nature to impart movement and supply strength. Now the functions of movement are pushing and pulling, so the tool of movement has to be capable of expanding and contracting. And this is just the nature of the *pneuma*. For it contracts and expands without con-

ἔσται, ὥστ' ἀνάγκη μὴ στιγμὴν ἀλλὰ μέγεθος τι εἶναι. ἀλλὰ μὴν ἐνδέχεται τὸ Γ ἄμα τῷ Β κινεῖσθαι, ὥστ' ἀνάγκη ἀμφοτέρως τὰς ἀρχὰς τὰς ἐν τῷ Α κινουμένας κινεῖν. δεῖ τι ἄρα εἶναι παρὰ ταύτας ἕτερον τὸ κινεῖν καὶ μὴ κινούμενον. ἀπερείδονται μὲν γὰρ ἂν τὰ ἄκρα καὶ αἱ ἀρχαὶ αἱ ἐν τῷ Α πρὸς ἀλλήλας κινουμένων, ὥσπερ ἂν εἴ τις τὰ νῶτα ἀντερείδοντες κινεῖν τὰ σκέλη. ἀλλὰ τὸ κινεῖν ἄμφω ἀναγκαῖον (ἐν) εἶναι, τοῦτο δ' ἐστὶν ἡ ψυχὴ, ἕτερον μὲν οὐσα τοῦ μεγέθους τοῦ τοιούτου, ἐν τούτῳ δ' οὐσα.

- 10 Κατὰ μὲν οὖν τὸν λόγον τὸν λέγοντα τὴν αἰτίαν τῆς κινήσεως ἐστὶν ἡ ὄρεξις τὸ μέσον, ὃ κινεῖ κινούμενον· ἐν δὲ τοῖς ἐμψύχοις σώμασι δεῖ τι εἶναι σῶμα τοιούτον. τὸ μὲν οὖν κινούμενον μὲν μὴ πεφυκὸς δὲ κινεῖν δύναται πάσχειν κατ' ἄλλοτριάν δύναμιν· τὸ δὲ κινεῖν ἀναγκαῖον ἔχειν τινὰ δύναμιν καὶ ἰσχύ· πάντα δὲ φαίνεται τὰ ζῷα καὶ ἔχοντα πνεῦμα σύμφυτον καὶ ἰσχύοντα τούτῳ. (τίς μὲν οὖν ἡ σωτηρία τοῦ συμφύτου πνεύματος, εἴρηται ἐν ἄλλοις.) τοῦτο δὲ πρὸς τὴν ἀρχὴν τὴν ψυχικὴν ὅμοιως ἔχειν ὥσπερ τὸ ἐν ταῖς καμπαῖς σημεῖον, τὸ κινεῖν καὶ κινούμενον, πρὸς τὸ ἀκίνητον. ἐπεὶ δ' ἡ ἀρχὴ τοῖς μὲν ἐν τῇ καρδίᾳ τοῖς δ' ἐν τῷ ἀνάλογον, διὰ τοῦτο καὶ τὸ πνεῦμα τὸ σύμφυτον ἐν ταῦθα φαίνεται ὄν. (πότερον μὲν οὖν ταῦτόν ἐστι τὸ πνεῦμα αἰεὶ ἢ γίνεται αἰεὶ ἕτερον, ἔστω ἄλλος λόγος· ὁ αὐτὸς γὰρ ἐστὶ καὶ περὶ τῶν ἄλλων μορίων.) φαίνεται δ' εὐφυνῶς ἔχον πρὸς τὸ κινητικὸν εἶναι καὶ παρέχειν ἰσχύ· τὰ δ' ἔργα τῆς κινήσεως ὥσιν καὶ ἔλξις, ὥστε δεῖ τὸ ὄργανον αὐξάνεσθαι τε δύνασθαι καὶ συστέλλεσθαι. τοιαύτη δ' ἐστὶν ἡ τοῦ πνεύματος φύσις· καὶ γὰρ ἀβίαστος συστέλλομένη (τε καὶ ἐκτεινομένη), καὶ ἐλκτική

32 ἄμα κινεῖσθαι τῷ Β b_1 36 ἄλληλα b_2 κινουμένων secl.
Platt 703^{a2} ἐν Γ.Α.Μ. ἀναγ. (ἀκίνητον) εἶναι Jacg. 7 μὲν
om. $b_1 M^1$ 18 ἔχειν b_2 , om. N 22 ἀβιάστος Fq. τε καὶ
ἐκτεινομένη Fq., coll. Mich. In PA 88, 35. Cf. et MP ad loc. (128, 5-6),
Them. In DA, 121, 14. ἐλκτική Fq., tractiva Γ, attractiva Δ:
βιαστική codd.

strait, and is able to pull and push for the same reason; and it has weight by comparison with the fiery and lightness by comparison with its opposite. Whatever is going to impart motion without undergoing alteration must be of this kind. For the natural bodies overcome one another according to their predominance: the light is overcome and kept down by the heavier, and the heavy kept up by the lighter.

We have said what the part is in virtue of whose motion the soul imparts movement, and what the reason is. We should consider the organization of an animal to resemble that of a city well-governed by laws. For once order is established in a city, there is no need of a separate monarch to preside over every activity; each man does his own work as assigned, and one thing follows another because of habit. In animals this same thing happens because of nature: specifically because each part of them, since they are so ordered, is naturally disposed to do its own task. There is, then, no need of soul in each part: it is in some governing origin of the body, and other parts live because they are naturally attached, and do their tasks because of nature.

- 11 We have now explained how animals move with voluntary motions, and for what reasons. But they also display involuntary movements in some of their parts, and more often non-voluntary movements. By involuntary I mean such movements as those of the heart and the penis; for often these are moved when something appears, but without the command of thought. By non-voluntary, movements such as sleep and waking and respiration, and all the others of this kind; for neither *phantasia* nor desire is, strictly speaking, in control of any of these. But since the animal must necessarily undergo natural alteration, and since when the parts are altered some grow and some waste away, so that at once it moves and undergoes the changes that natu-

καὶ ὥστικὴ διὰ τὴν αὐτὴν αἰτίαν, καὶ ἔχει καὶ βάρος πρὸς τὰ πυρώδη καὶ κουφότητα πρὸς τὰ ἐναντία. δεῖ δὲ τὸ μέλλον κινεῖν μὴ ἀλλοιώσει τοιοῦτον εἶναι· κρατεῖ γὰρ κατὰ τὴν ὑπεροχὴν τὰ φυσικὰ σώματα ἀλλήλων, τὸ μὲν κοῦφον κάτω ὑπὸ τοῦ βαρυτέρου ἀπονικώμενον, τὸ δὲ βαρὺ ἄνω ὑπὸ τοῦ κουφοτέρου.

Ὡς μὲν οὖν κινεῖ κινουμένῳ μορίῳ ἡ ψυχὴ, εἴρηται, καὶ δι' ἣν αἰτίαν. ὑποληπτέον δὲ συνεστάναι τὸ ζῶον ὥσπερ πόλιν εὐνομουμένην. ἐν τε γὰρ τῇ πόλει ὅταν ἀπαξ στή ἡ τάξις, οὐδὲν δεῖ κεχωρισμένου μονάρχου, ὃν δεῖ παρῆναι παρ' ἑκαστον τῶν γινομένων, ἀλλ' αὐτὸς ἑκαστος ποιεῖ τὰ αὐτοῦ ὡς τέτακται, καὶ γίνεται τόδε μετὰ τόδε διὰ τὸ ἔθος· ἐν τε τοῖς ζῴοις τὸ αὐτὸ τοῦτο διὰ τὴν φύσιν γίνεται καὶ τῷ πεφυκέναι ἑκαστον οὕτω συνστάντων ποιεῖν τὸ αὐτοῦ ἔργον, ὥστε μηδὲν δεῖν ἐν ἑκάστῳ εἶναι ψυχὴν, ἀλλ' ἐν τινι ἀρχῇ τοῦ σώματος οὔσης τάλλα ζῆν μὲν τῷ προσπεφυκέναι, ποιεῖν δὲ τὸ ἔργον τὸ αὐτῶν διὰ τὴν φύσιν.

- 11 Πῶς μὲν οὖν κινεῖται τὰς ἐκουσίους κινήσεις τὰ ζῶα, καὶ διὰ τίνας αἰτίας, εἴρηται. κινεῖται δὲ τίνας καὶ ἀκουσίους ἐν τῶν μερῶν, τὰς δὲ πλείστας οὐχ ἐκουσίους. λέγω δ' ἀκουσίους μὲν οἷον τὴν τῆς καρδίας τε καὶ τὴν τοῦ αἰδοίου (πολλάκις γὰρ φανέντος τινός, οὐ μέντοι κελεύσαντος τοῦ νοῦ κινεῖνται), οὐχ ἐκουσίους δ' οἷον ὕπνον καὶ ἐγρήγορσιν καὶ ἀναπνοήν, καὶ ὅσαι ἄλλαι τοιαῦταί εἰσιν (οὔτε νὸς γὰρ τούτων κυρία ἀπλῶς ἐστίν οὔθ' ἡ φαντασία οὔθ' ἡ ὄρεξις). ἀλλ' ἐπειδὴ ἀνάγκη ἀλλοιοῦσθαι τὰ ζῶα φυσικὴν ἀλλοιώσιν, ἀλλοιουμένων δὲ τῶν μορίων τὰ μὲν αὔξεσθαι τὰ δὲ φθίνειν, ὥστ' ἤδη κινεῖσθαι καὶ μεταβάλλειν τὰς

25 κρατεῖται b_1 31 στή ab_1b_2N : συστή PA 35 τῷ] τὸ Vb_1P ἑκαστον <τῶν> $Fq.$ 37 τὴν ψυχὴν N 703^{b4} τίνας δὲ καὶ ἀκουσίους κινεῖται b_2PN 5 οὐχ $om.$ EYV , $corr.$ V^2 7 φανέντος γὰρ πολλάκις $XLPN$ 10 ἀπλῶς $om.$ b_2 13 ὥστ'] ὥστε μὴ a

rally succeed one another (heatings and chillings, both those from without and those which occur naturally within, being responsible for the movements)—for this reason the irrational movements, too, of the above-mentioned parts occur when an alteration has taken place. For thought and *phantasia*, as we explained earlier, present that which produces the affections, in that they present the forms of the objects that produce them. Now these parts exhibit these motions most conspicuously, since each of them is like a separate living creature. [The reason for this is that they contain vital moisture.] In the case of the heart, the reason for this is clear: in it are the origins of the senses. And there is evidence that the generative part, too, is of this kind: for the force of the semen comes forth from it like a kind of living creature. Furthermore, it is quite reasonable that movements are set up in the origin by the parts and in the parts by the origin, and so reach one another. Let A be the origin. Then the movements from each letter in the diagram we have drawn arrive at the origin, and from the origin as it moves and changes (since it is potentially many) the movement of B goes to B, that of C to C, that of both to both. But from B to C it goes by going first from B to A, as to an origin, then from A to C, as from an origin. As for the fact that as a result of the same thoughts there is sometimes an irrational movement in the parts, sometimes not, the reason for this is that sometimes the passive matter is present in the right quantity and quality, and sometimes not.

We have now discussed the reasons for the parts of each animal, the soul, and also sense-perception, sleep, memory, and movement in general. It remains to speak of generation.

πεφυκυίας ἔχασθαι μεταβολὰς ἀλλήλων (αἰτίαι δὲ τῶν κινήσεων θερμότητές τε καὶ ψύξεις, αἷ τε θύραθεν καὶ αἱ ἐντὸς ὑπάρχουσαι φυσικαί), καὶ αἱ παρὰ τὸν λόγον δὴ γινόμεναι κινήσεις τῶν ῥηθέντων μορίων ἀλλοιώσεως συμπεσοῦσης γίνονται. ἡ γὰρ νόησις καὶ ἡ φαντασία, ὥσπερ εἴρηται πρότερον, τὰ ποιητικὰ τῶν παθημάτων προσφέρουσι· τὰ γὰρ εἶδη τῶν ποιητικῶν προσφέρουσι. μάλιστα δὲ τῶν μορίων ταῦτα ποιεῖ ἐπιδήλως διὰ τὸ ὥσπερ ζῶον κεχωρισμένον ἑκάτερον εἶναι τῶν μορίων. [τούτου δ' αἷτιον ὅτι ἔχουσιν ὑγρότητα ζωτικὴν.] ἡ μὲν οὖν καρδία φανερόν δι' ἣν αἰτίαν τὰς γὰρ ἀρχὰς ἔχει τῶν αἰσθήσεων· τὸ δὲ μόριον τὸ γεννητικὸν ὅτι τοιοῦτόν ἐστι, σημείον· καὶ γὰρ ἐξέρχεται ἐξ αὐτοῦ ὥσπερ ζῶον τι ἡ τοῦ σπέρματος δύναμις. αἱ δὲ κινήσεις τῇ τε ἀρχῇ ἀπὸ τῶν μορίων καὶ τοῖς μορίοις ἀπὸ τῆς ἀρχῆς εὐλόγως συμβαίνουσι, καὶ πρὸς ἀλλήλας οὕτως ἀφικνοῦνται. δεῖ γὰρ νοῆσαι τὸ A ἀρχήν. αἱ οὖν κινήσεις καθ' ἕκαστον στοιχείον τῶν ἐπιγεγραμμένων ἐπὶ τὴν ἀρχὴν ἀφικνοῦνται, καὶ ἀπὸ τῆς ἀρχῆς κινουμένης καὶ μεταβαλλούσης (ἐπειδὴ πολλὰ δυνάμει ἐστίν), ἡ μὲν τοῦ B [ἀρχῇ] ἐπὶ τὸ B, ἡ δὲ τοῦ Γ ἐπὶ τὸ Γ, ἡ δ' ἀμφοῖν ἐπ' ἀμφοῖν. ἀπὸ δὲ τοῦ B ἐπὶ τὸ Γ τῷ ἀπὸ μὲν τοῦ B ἐπὶ τὸ A ἐλθεῖν ὡς ἐπ' ἀρχήν, ἀπὸ δὲ τοῦ A ἐπὶ τὸ Γ ὡς ἀπ' ἀρχῆς. ὅτι δὲ ὅτε μὲν ταῦτα νοησάντων γίνεται ἡ κίνησις ἡ παρὰ τὸν λόγον ἐν τοῖς μορίοις, ὅτε δ' οὐ, αἷτιον τὸ ὅτε μὲν ἐνυπάρχειν τὴν παθητικὴν ὕλην ὅτε δὲ μὴ τοσαύτην ἢ τοιαύτην.

Περὶ μὲν οὖν τῶν μορίων ἑκάστου τῶν ζώων, καὶ περὶ ψυχῆς, ἔτι δὲ περὶ αἰσθήσεως καὶ ὕπνου καὶ μνήμης καὶ τῆς κοινῆς κινήσεως, εἰρήκαμεν τὰς αἰτίας· λοιπὸν δὲ περὶ γενέσεως εἰπεῖν.

22 τούτου . . . 23 ζωτικὴν secl. Jaeger 28 ἀλλήλα P: ἀλλήλα δὲ S (O^d incert.) b₂N 34 τῷ τὸ δὲ b₁: τὸ δ' b₂N 36 ὅτι] ἔτι aL ταῦτα Jaeger: τὰ αὐτὰ P, eadem Γ: ταῦτα ab₂M¹ 37 οὐ] οὐ EA τὸ om. E 704^a1 ὑπάρχειν YNA 704^b2 εἰρήκαμεν τὰς αἰτίας] εἴρηται b₂PN δὲ] δὲ καὶ b₂P

PART III

INTERPRETIVE ESSAYS

ESSAY 1

ARISTOTLE ON TELEOLOGICAL EXPLANATION

He charged like a hill-bred lion, ravenous
for meat, whose proud heart urges him to dare
an attack on the flocks in a close-kept sheepfold.
And even should he find herdsmen there
watching over the sheep with spears and dogs,
he will not think of turning back, empty,
without attacking. Now he must spring down
on a sheep and kill it—otherwise be pierced,
unyielding, by a shaft from a swift hand.

Iliad XII.299–306.

“All animals impart movement and are moved for the sake of something, so that this is the limit of their movement, the thing for-the-sake-of-which” (*MA* 6, 700^b16–17). So Aristotle announces his preference for a teleological account of animal and human behavior. Explanation begins with a goal or end and shows how the animal’s activity tends to realize that end. The scientist is instructed to analyze the “hill-bred lion”’s attack not simply as the response of a physiological mechanism to external stimuli (although this picture, too, may have its usefulness in describing the workings of his physiological apparatus). He is to remain close to the Homeric (or ordinary) account, which mentions the lion’s “proud heart,” his needs and desires, and presents the external object as seen from the point of view of the desiring being. The *MA* presents a model for the teleological explanation of animal behavior and indicates how this account is related to other, non-teleological accounts. To interpret the treatise correctly we must, then, understand why, and in what form, Aristotle endorses teleology. This essay will present a general exposition of his views on the “final cause” as background for a better understanding of his picture of animal behavior.

Aristotle's teleology has often been badly misunderstood. In recent work in the philosophy of biology, he has been held up as the source of the false and inflated claims that have given teleology a bad name among scientists: claims that mysterious or supernatural agencies guide things towards goals; that all natural processes, even the changes of non-living substances, have a teleological explanation; that there is a universal teleology of nature, in which the activities of some species subserve the ends of others. It has even been suggested that moderate defenders of teleological explanation should coin a different name for their theory, so tainted is the old word "teleology" as a result of Aristotelian excesses.¹ These misconceptions have been attacked, but nowhere refuted as comprehensively and consistently as one might wish.² In fact, Aristotle's position is both moderate and interesting, well worth exploring in some detail. We must begin by looking at some of his claims about the roles of form and matter in explanation, in order to characterize in very general terms his criticisms of low-level material accounts. Out of this general defence of the formal principle, he develops an argument that teleological accounts are the most satisfactory way of explaining both the non-conscious growth and development of all living things and the intentional or quasi-intentional activities of animals. The argument proves, on examination, to be a sound and fruitful one, invoking no mysterious non-empirical entities, no efficient-causal gaps. It will emerge, furthermore, that Aristotle neither applies teleology to non-living natural bodies nor gives any evidence of believing in a universal teleology of nature.³

¹ Cf. Mayr, "Cause and Effect," and G. G. Simpson, *This View of Life*.

² Some recent contributions that have helped to clarify the picture are: Ayala, "Teleological Explanations"; Balme, *Aristotle's Use of the Teleological Explanation*; Wieland, "The Problem of Teleology". Ayala's attack on Mayr's reading of Aristotle is based on Randall's *Aristotle*, rather than on a close analysis of texts.

³ As is argued—to cite only two prominent examples—by Owens, "Teleology of Nature," and Zeller, *Phil. der Gr.* II.2, 339.

THE DEMOCRITEAN CHALLENGE

In order to bring out more clearly from the start what the alternatives are, and what is at stake in the debate over teleology, let us provide Aristotle with an imaginary opponent. His predecessors in natural science, Aristotle often tells us, used to spend all their time searching for explanations of natural bodies and their activities in terms of the interactions of low-level material constituents, thinking that the end of science was to reduce all substances to these basic building blocks and to give causal accounts of change on this level (especially *PA* 640^b 4 ff.). "If we look at the early thinkers, the study of nature would appear to be the study of matter" (*Ph.* 194^a 18–19). Aristotle repeatedly attacks them for their lack of attention to formal and final explanation, insisting that form, and not matter, is the basic explanatory principle of living beings and their activities, and that, furthermore, the growth and motion of animals and plants must be explained with reference to an end-state—the mature functioning of the adult creature, as specified in its *logos*. His defences of formal and of final explanation are closely connected: in living creatures, the soul is both form and end (*DA* 415^b 8–12), and, in general, "the what is it and the for-the-sake-of-which are one" (*Ph.* 198^a 25–26). Nonetheless, the two defences are worth examining separately, and the best way to begin sorting out the issues is to have a more concrete picture of the view of scientific explanation that Aristotle is combatting. He has, at various times, many different opponents in view—the Milesians, Empedocles, even Anaxagoras. But it will be convenient to make Democritus, in some ways the most rigorous and the most self-conscious of the ancient materialists, the spokesman for them all—and to imagine him giving a defence of materialist reductionism that is both more sophisticated and more informed by Aristotle's own distinctions than the actual Democritus' work ever could have been.⁴ Let us suppose, *per impossibile*, that

⁴ The historical Democritus is, of course, very different from modern materialists in that he has no empirical warrant at all for the claim that atoms are the basic particles. In what follows I shall ignore this.

Democritus has arrived at the Lyceum, prepared to question Aristotle about his theory of explanation. He comes equipped with copies of *Metaph.* VII, *Ph.* II, the *DA*, the *PA*, book I, and a little-known treatise of dubious authenticity, the *De Motu Animalium*.⁵

D: Aristotle, you have worked out a very elaborate account of scientific explanation, but it seems to me a most uneconomical and unscientific one. You begin with a peculiar premise: that we should not press for just one most basic type of explanation, but should give, as scientists, accounts of as many different types as are furnished us by the data of ordinary speech, leaving out no distinctive type.⁶ "Since there are four kinds of explanation, the natural scientist ought to know about all of them, and if he makes use of all of them (where possible and relevant), he will answer the 'why' question in a manner befitting a scientist" (*Ph.* 198^a 22–23). I take issue with you right here. What kind of a scientific program is this—to round up all the ways we loosely and imprecisely explain the world in our ordinary talk, and then to hold the expert responsible for reproducing this confusion in his own work? It seems plain to me that the job of the scientist is to find beneath the confusion of the "appearances" the simple and precise laws that will explain them all; and a single account is evidently better, and more scientific, than a plurality. We must not put up with four accounts if we can re-

⁵ For my characterization of the general problem of functional-vs.-low-level material explanation, I am heavily indebted to Putnam, "Philosophy and our Mental Life"; and also, on certain points, to Wiggins, "Identity . . . and Physicalism." On teleological explanation in particular, I am indebted to all the works of Taylor cited in the bibliography—especially, perhaps, "The Explanation of Purposive Behaviour." The position I ascribe to Aristotle departs a good deal from Taylor's, particularly in its insistence that teleological explanations are superior in generality and simplicity where *any* self-maintaining behavior, including the non-purposive, is in question.

⁶ On the search for a complete list of *aitiai*, cf. *Metaph.* 983^b3 ff., 988^b17 ff.

duce them all to one. The fact that ordinary men continue to speak of forms and goals is no reason why we should not dispense with these inconveniences in favor of a more basic material account.

But you do not simply insist on a plurality of explanations. You go on to criticize my interest in ultimate matter, claiming that it is form, and not matter, which is fundamental in our explanations of living beings and their activities, even of the nature and functioning of artifacts (*PA* 640^b 22 ff.):

If we were describing a bed, or any other similar artifact, we should seek to describe the form of it, rather than the matter (e.g., bronze or wood)—and if not this, then at least the matter as matter of a compound whole. For example, a bed is this in this, or a this qualified in such-and-such a way—so we must speak of the configuration as well, and the form. For nature in the sense of form is more fundamental than nature in the sense of matter.⁷

In *Metaph.* VII (although I shall not attempt to follow those arguments in detail) you again appear to be claiming that form is basic to our explanations and definitions (especially of living things) in a way that matter is not. You do not even seem to want us to *mention* matter in our definitions (though you are unclear in those chapters), and you insist that it is form, rather than the constituent matter, that provides the best or most basic explanation for the thing's being what it is and acting as it does (cf., e.g., VII.17, 1041^b6–8, 27 ff.). "We must speak of the form, and of the thing *qua* having form, as each thing, but the material (aspect) must never, by itself, be said to be the thing" (1035^a7–9).

I, of course, think that the material aspect is what really *is*, and should be said to be, the thing. When we speak of men, horses, and beds, we are speaking of what appears to us; in reality, all this is atoms and the void. The most lucid, simple, and basic account of the movements of an animal or the structure

⁷ Cf. *Metaph.* 1034^a5–8: the whole man, Kallias or Sokrates, is "such-and-such a form in such-and-such flesh and bones."

of a bed is the one which succeeds in arriving, with precision, at the underlying reality of the ultimate constituents—the atoms and void that the thing really is—and in tracing these accurately over time. Now I see that one of your worries, perhaps the main motivation behind your defence of form, is that we do not, in fact, succeed in tracing atoms as they move rapidly from one so-called substance to another. You ask, how can the best explanation of the Homeric lion's behavior be an atomic one, when that lion's matter is always changing imperceptibly, and only his form or organization remains the same? You infer from this that our explanations of a lion's life-activities should not reduce form to ultimate matter—that it is via form that we trace a complex living being over time, identify and reidentify it, and come to know its nature. I think you have made the very fundamental mistake of confusing a contingent point about the deficiency of our present-day science of matter with a thesis of deep philosophical significance. Your criticism works only against our sloppy, underdeveloped present-day science of matter, and would have no force against the more sophisticated theory that I see as the business of science to develop. Suppose, for instance, that one of your famous bronze spheres, radius r , is thrown through one of your wooden circles, radius slightly greater than r . I shall soon be able to give you a very illuminating account of the entire process, without even mentioning sphericity or circularity, by plotting all the motions and interactions of the atoms that go to make up the bronze and the wood. Or suppose that the Homeric lion desires meat, plots an attack, then leaps down upon a helpless lamb. I could give you that in language which would be less decorative, to be sure, but much more revealing, by talking of the necessary collisions of the ultimate particles that go to make up the Homeric lion over time.⁸ Once I have succeeded in doing that, what reason will you have for defending your loose talk of form and shape? Homer is more

⁸ Democritus here shows no familiarity with the theory of the random "swerve," later added to atomistic physics to leave room for free will and action.

amusing; but when you have my account you really know what is going on in terms of the ultimate constituents of the universe. Instead of saying, "The formal aspect should be said to be the thing, but the material aspect should never be spoken of by itself," you ought to say, "It's the material that's really the thing; and can offer us the most basic explanations of its behavior; but if we do not know enough to give a precise account of that, we will have to make do with our loose, everyday talk of forms."

Before you reply, I have another complaint. You defend not only form, but another sort of explanation which I do not fully understand—the one you call "for-the-sake-of-which." "All animals impart movement and are moved for the sake of something," you claim in your cryptic little book on animal motion. The lion's leap is supposed to be seen as for the sake of a goal or end, not just as the outcome of an antecedent sequence of physiological changes. In the first book of *DA* (403^a29 ff.), you offer a promising causal account of anger as the boiling of blood around the heart and contrast that account with the imprecise or "dialectical" ordinary definition: the desire for revenge. But then you very obscurely say that the real natural scientist will give *both* accounts (403^b8–9). Again, in the first book of your *Parts of Animals* you instruct students of biology to give a teleological, as well as a mechanistic account of respiration:

Exposition should be as follows: for example, breathing is for the sake of *this*, while that comes to be of necessity because of those (642^a31 f.).

You ask for the necessary causal linkage on the material level (the "this from this of necessity," *Ph.* 198^b5–6), but you also require an explanation mentioning the goal. In the *Motion of Animals* you have a nice section dealing with the necessary interactions of hot and cold materials in animal bodies, in the course of which you compare animals to automatic puppets: a small initial change in the matter determines an entire material sequence, which follows automatically. But you still do not concede that this makes explanation in terms of goals and desires

otiose: you insist that all animals, and, more oddly still, even the heavenly bodies, are moved "for-the-sake-of something."

You are not a completely unscientific philosopher. You take a great deal of interest in ultimate matter, and in necessary causal sequences. It also seems to me that you do not espouse teleology in a naïve, Panglossian fashion: you keep these accounts *within* species boundaries, making the relevant end the mature functioning of the normal adult. You are also ready to concede that many natural events are *not* "for something"—apparently most of the changes happening to non-living things.⁹ But if you are so moderate, why are you also so blind as to keep teleology around at all? Can't you see that a simple pruning out of all that otiose material would put your really scientific work in a much better light? That the *De Motu*, for example, would look a lot more modern and precise if you cut chapter six, and the strange part on the so-called "practical syllogism," and expanded your efficient-causal account of animal motion, getting clearer about the nature of the basic material particles? Or are you determined to remain attached to your methodological principle that we should not have just one simple account where we can have a confusing plurality?

To conclude, then, Aristotle: you tell us in your lengthy discussions of "what is" that the primary category of what is is substance, and that substance, in the primary sense, is form. In your accounts of explanation you insist that the formal-teleological account gives us the most insight into the nature of living things. But, in fact,—if I may paraphrase a piece of my own work—form is a convention, the for-the-sake-of-which is convention; what there really is is atoms and the void.¹⁰

Democritus has conceded some points to Aristotle that not all interpreters would, and that we shall have to consider later: the restriction of teleological explanation to living beings, the

⁹ Cf. *Metaph.* 1044^b12 and *Ph.* 198^b18–19, to be discussed below.

¹⁰ Cf. Democritus, *DK B 9*.

parallelism of teleological and mechanistic accounts of behavior, the absence of Panglossian universal teleology. But he has raised what seem to be the most serious questions for Aristotle's theory and has revealed in his arguments some materialist assumptions that infect not only many modern interpretations of Aristotle, but also much modern original writing on these subjects. Aristotle's answer must fall, as has the challenge, into two parts: (1) a defence of explanations on the formal or structural level, rather than at the level of ultimate matter; (2) a defence of explanations that are teleological, rather than efficient-causal, in direction.

THE LEVEL OF EXPLANATION: FORM AND MATTER

A: Your challenge, Democritus, illustrates very nicely what I have so often objected to in Pre-Socratic science: its assumption that the only really "scientific" study is the study of matter, that explanations are more precise and more scientific the more they cast off the "appearances"—the concepts and theories that figure in our ordinary accounts of the world—and point to a material "reality" behind these. Thales thought he had done wonders for science when he said it's all made of water—although he had not enabled himself to say *what* it was that was so made, or to account for its changes. Empedocles added to his account of basic constituents *some* story about how compound bodies were put together; but his story did not take account of the fact that natural bodies are born, grow, live, and decay as organic wholes.¹¹ Now you suppose that you have made great progress by reducing all the physical world to ultimate particles and the void, assuming only some simple laws of motion and interaction. You, like the others, equate "scientific" with "reductionistic," and assume that the most interesting explanation is the one that moves the furthest from the ordinary in the direction of basic material stuffs. Throughout your speech I noticed words like "illuminating," "revealing," "interesting,"

¹¹ Cf. *Ph.* 11.8 on teeth, and especially *PA* 640^a19 ff. on the spine, to be discussed below n. 22.

"basic," that you used (forgive me) with the naïve persistence of a zealot rather than the balanced judgment of a scientist. By "illuminating" you really seem to mean nothing more than "concerned with ultimate matter"—since, as I shall argue, in no other more truly scientific sense of "illuminating" could your accounts make this claim.

My methodological principle is not, of course, the one you ascribe to me (not to make do with simplicity when you can have confusion); it is, rather, not to make do with one story when another is available which gives new and relevant information. Particularly, of course, not to neglect the explanation that is the most general and has the greatest predictive power in favor of one that is hardly an explanation at all. You assume throughout that if formal-teleological and material accounts are accounts of the same beings or events (if there are no mysterious disembodied "purposes" or Platonic souls), then my formal accounts are otiose and are retained only from old-fashioned pedantry or intellectual dimness. I do not appear to believe in disembodied purposes, or in separable substantial souls;¹² I say quite clearly that the soul is the form of the living body, and that it is wrongheaded even to *ask* whether the soul and the body are one (*DA* 412^a6–^b9). Ergo, by your argument, I am wrong-headed to keep on talking of forms. If we are enmattered beings, our behavior is best explained using the low-level laws of material particle interaction.

There are a number of confusions in this argument, which it will take some time to sort out. I agree that we must not get entangled now in a detailed analysis of the arguments of *Metaphysics* VII. You seem to me to have read it rather well. At least you have grasped that my two most important claims about form in that book are these: (1) Form, and not matter, remains the same as long as this is the same X; and hence it is form, and not matter, that enables us to identify and reidentify complex substances. The lion's matter is constantly changing as he assimilates food and excretes wastes; it is his form that must

¹² Aristotle is here abstracting from the complexities added to this general picture by his theories of *nous* and of the unmoved mover.

persist as long as this particular lion is in existence. (2) It is form, and not matter, with reference to which we can arrive at the most satisfactory explanations of the activities and motions of both living beings and artifacts. (I am, in VII, interested primarily in living creatures; it is no accident that most of my detailed examples concern souls and bodies. I even say repeatedly that the word "substance" is used primarily for the natural¹³—just as, in the *Categories*, my primary substances were natural kinds. It is much clearer for these than for artifacts what the form is that provides a principle of unity and identity. If you add a wing onto a house, its shape changes; it is hard to say whether it is still the same house. But we have a very clear notion of what changes a lion can undergo and still be the same creature.)

Now I want, first of all, to address your claim that the best explanations are on the level of ultimate constituents, that what is "really real" (the real substance) is atoms rushing through a void. I shall grant for the sake of argument that your theory of ultimate matter is correct and use the geometrical examples you so kindly introduced to make my objection clear.¹⁴

We have a bronze sphere of radius r that passes through a circular wooden hoop of radius just slightly greater than r . Let us say that we also have a bronze cube of side $2r$. It will not, of course, pass through the hoop. Suppose I ask you, "Why?" You denigrate attempts like mine to make available a variety of answers to "why"-questions; for you, the only scientific answer will be one that lists the atoms that compose the hoop and the two bronze figures, charts their distances and positions in the void, and gives a precise, elaborate account of all the movements and trajectories of all the particles. I, on the other hand, will

¹³ Cf. *Metaph.* 1014^b27, 1041^b28–31, 1040^b14, 1043^a4, ^b21. A very interesting analysis of *Metaph.* VII along similar lines is in an unpublished paper by Michael Frede.

¹⁴ Aristotle appears to be indebted for this example to Putnam's paper (pp. 295–98) cited in n. 5 *supra* (though Putnam, in this same paper, expresses his indebtedness to Aristotle, with whom the argument clearly got its start).

hold that the relevant explanation is a very simple one in terms of simple laws of geometry known to all of us and that your charting procedure is simply irrelevant to the "why" question as I have asked it. (1) It is my account, rather than yours (as you suggested) that is *simple*. Yours is extraordinarily complicated, and the answer would never become perspicuous to the interlocutor. (2) My account is also more *general* than the account that invokes ultimate matter: for instance, I can predict that if we did the same thing with a wooden sphere and a bronze circle, the result would be the same; you would have to redo all your computations. (3) My account invokes only the *relevant* data: the dimensions and shapes of the bodies. Yours, on the other hand, is full of irrelevancies. "What we seek is the explanation, i.e., the form, by reason of which the matter is some definite thing" (*Metaph.* 1041^b6–8); it does not matter, for these purposes, whether the form of sphere is realized in bronze or wood or bone. "In the case of things that are found to occur in specifically different materials, as a circle may exist in bronze or stone or wood, it seems plain that these, the bronze or the stone, are no part of what it is to be a circle, since it is found apart from them" (*Metaph.* 1036^a32 ff.). Again, if we were describing a bed and what it was good for, we would cite the relevant structural features (rigidity, a certain length and shape) and mention the *specific* matter only as that in which the form was appropriately realized (*PA* 640^a23 ff.): the formal nature is more relevant to explanation here, too (*kuriōtera*, 640^b28), than the material nature. The form must be realized in *some* sort of suitable matter, but the matter is relevant to a general explanation only as being some stuff that can potentially function in the way specified in the formal account.

Now so far you might suppose that a formal account would not have anything to say about *function*. The examples of the sphere and the cube suggest that by "form" I mean merely "shape" or "configuration;" indeed, I myself frequently use the words *morphē* and *schēma* to designate the form. In the case of artifacts, this is usually all right, since shape and suitability to function tend to coincide: the aesthetic value of a statue depends

on its morphology, the capacity of a solid body to pass through a hoop on its size, shape, and rigidity. But in the case of living things, it is very clear that to explain behavior we must refer, not to surface configuration, but to the functional organization that the individuals share with other members of their species. This is the form; this, and not the shape, remains the same as long as the creature is the same creature. The lion may change its shape, get thin or fat, without ceasing to be the same lion; its form is not its shape, but its soul, the set of vital capacities, the functional organization, in virtue of which it lives and acts. If the eye were an animal, sight, not sphericity, would be its soul; if an axe were an animal, not wedge-shape, but cutting, would be its first actuality (*DA* 412^b10 ff.). A corpse has the same *shape* as a living man; but it is not a man, since it cannot perform the activities appropriate to a man (*PA* 640^b30–641^a17). When I ask for a formal account of lion behavior, I am not, then, asking just for a reference to tawny color or great weight. I am asking for an account of what it is to be a lion: how lions are organized to function, what vital capacities they have, and how these interact. And it is this, again, rather than an enumeration of its material constituents, that will provide the most simple, general, and relevant account for the scientist interested in explaining and predicting lion behavior (cf. *PA* 641^a7–17). You tell me that this particular lion in book XII of the *Iliad* has five billion atoms, of such-and-such shape, in such-and-such configurations, and plot me a chart of collisions and motions. Homer tells me that lions need meat, that they are proud and strong, that when they are hungry they take great risks to attack sheepfolds, and are often brave enough and skilled enough to beat off attackers. If you were a shepherd in charge of the flocks, which account would give you more information that was relevant to your plans and precautions? From eight lines of Homer I learn more that is general and valuable about the behavior of lions than I would from two volumes of detailed atom-charts.

You may imagine at this point that I am turning Platonic and casting aspersions on matter as a proper object of serious scientific concern. My terminology, which appears constantly to set

up an *opposition* between form and matter, can be misleading on this point. Actually, of course, the form of a living being is not something separable from matter; it is something material, a functional state of matter—or, if you prefer, a first entelechy (the organization-to-function, analogous to “sight”) of some matter. In the geometrical cases we have discussed, one might argue that the relevant explanation need make no reference at all to matter. The mathematician treats of form and shape as separable from change (*Ph.* 193^b32 ff.). The bronze is no part of a sphere’s essence; sphericity can be realized in many different sorts of matter, but it can also be studied and defined completely in abstraction from matter. But living beings are necessarily enmattered. Although the account of what it is to be a man or an animal should not make the mistake of supposing that the flesh and bones in which such creatures always, in our experience, turn up are necessary parts of their essence (for if we found tomorrow a creature made of string and wood who performed all the functions mentioned in our formal account of what it is to be human, we could not rule him out simply on material grounds), it should at the same time recognize that *some* sort of matter is necessary for the performance of these functions. Socrates the younger suggested that we could define “animal” as we define “circle”—without any reference to matter. “But the case is not similar; for an animal is something perceptible, and it is not possible to define it without reference to change—not, then, without reference to the parts’ being in a certain state” (*Metaph.* VII.11, 1036^b27 ff.). Circularity is a form that may or may not be enmattered; soul is a functional state of some matter, so that any account of it must mention the realization of this state in *some* sort of suitable stuff. As the snub, unlike concavity, is inseparable from, and inexplicable without reference to, its realization in some material stuff of a suitable kind, so with beings in nature: “For none of these is the account without reference to change; they always have matter” (*Metaph.* 1026^a2–3). “We should study such things neither apart from matter, nor according to matter only” (*Ph.* 194^a13–15). Soul is the first actuality of a natural body potentially having life (*DA*

412^a27–28); soul and body are as much one as the wax and its shape (*DA* 412^b6–9).¹⁵

Thus when I criticize your material accounts for living beings, I do not mean to suggest that we want to explain their behavior on the level of form where form is distinct from, and seen in abstraction from, matter. I am distinguishing two levels on which we can give a material account: the level of ultimate particles, and the level of matter’s functional states. Perception, desire, etc., are not physical in the sense that the best account of them involves reference to the basic particles of atomistic (or any other) physics. But they are physical in the sense that an account of what they are necessarily involves matter.¹⁶ Form is not a constituent of the animal over and above its material constituents (although my expression “the compound” might mislead one on this point—cf. *Metaph.* 1041^b12 ff.); it is the arrangement of the constituents themselves. “To eliminate the matter is beside the point; for some things just *are* this in this, or these in such-and-such a state” (*Metaph.* 1036^b22–24).

I have tried to show that you, Democritus, although you are right to suppose that living creatures are necessarily physical entities, are wrong to infer from this that the best explanation

¹⁵ The position on VII.10–11 taken here is roughly the one defended by Sellars in “Substance and Form” and “Raw Materials.” The unmoved mover is, of course, an exception to this account and to the *DA* definition, as are the heavenly spheres as well to the next definition—“entelechy of a natural *organic* body.”

Putnam argues that to insist that the functional state be realized in *matter* is already too restrictive: “What we are really interested in, as Aristotle saw, is form and not matter. . . . And whatever our substance may be, soul-stuff, or matter or Swiss cheese, it is not going to place any interesting first order restrictions on the answer to this question” (302). The difference between Aristotle and Putnam here is, I think, only verbal. Both concede that the functional states of living creatures are realized in some *stuff* (or what Putnam calls “substance”); Aristotle uses the term *hylē* (“matter”) for “stuff” conceived in the most general possible way, while Putnam uses it for a certain kind of “stuff”—the basic particles of physics and chemistry.

¹⁶ Cf. Wiggins, “Identity,” 25–26, and the parallels with Hobbes in nn. 22–24.

of their behavior is on the level of basic particles. Whether we think of animals or of artifacts, in most cases structural principles provide explanations that are superior in economy and generality to the elaborate atomistic accounts you project. In the case of living beings, the account will be concerned not with form in the sense of *shape*, but with form in the sense of functional organization; and this formal account, unlike the formal accounts of mathematical entities, necessarily involves matter.

TELEOLOGY: THE DIRECTION OF EXPLANATION

You had a second complaint: that where there appears to be a complete explanation of a motion or process in terms of an antecedent causal sequence, it is otiose to invoke the goal, or the "for-the-sake-of which." I was glad to see that you did not make some of the more common mistakes about my teleological accounts: you saw that they do not require us to introduce mysterious, non-empirical processes and events—for example, a divine guidance of the universe towards the good, or mysterious strivings in matter to realize form.¹⁷ But, having seen this, you were then faced with the more interesting question: why, given that teleology does not posit entities different from those that turn up in a causal account, is it not simply redundant? How can it claim to contribute anything distinctive to our understanding of natural beings and processes? You actually conflated your attack on teleology with your defence of explanation at the atomistic level; I have already begun to answer you by criticizing those ideas—all the more since the form of the living body is the end or goal with reference to which I argue that most teleological explanations are to be given. Let me, however, ignore atomistic reductionism for the present, and try to give a general defence of teleological accounts as compared with any account in terms of an antecedent efficient-causal sequence, elaborating the claim I made at *PA* 639^b12 ff.:

¹⁷ Cf. Zeller, n. 3, *supra*: "Alteration and change have their place only in matter, and are directed towards form by a striving which dwells in matter."

And further, since we see more than one explanation in connection with coming-to-be in nature, for example, the explanation *for the sake of which*, as well as the explanation *from which comes the beginning of the movement*, we must be clear about these too, as to which sort of explanation is naturally first, and which naturally second. First is evidently the one we call *for the sake of something*. For this is the definition, and the definition is the beginning in natural things.

A teleological account claims that *x* happens for the sake of *y*.

More precisely, it can claim either that (1) $x \left\{ \begin{smallmatrix} \text{happens} \\ \text{is} \end{smallmatrix} \right\}$ for the sake of *y*, or that (2) *O* did *x* for the sake of *y*. Let us call the first an objective teleological account; it characterizes both the goal and the process or system from the scientist's point of view, and presupposes no conscious awareness on the part of the agent. The second account, which we shall call the subjective, claims in addition that the animal is aware of the goal. It mentions the goal under its intentional description for the agent, and implies that it is this description of the goal that is relevant in understanding why the action occurred. Some examples of the relevant types would be:

- (1) (a) Growth takes place in *O* in such-and-such a way because *O* is a lion (i.e., for-the-sake-of realizing lion-form).
- (b) The function of eyes in lions is seeing.
- (2) The lion entered the sheepfold to get meat.

This last sort of case is the kind for which teleological accounts would, perhaps, be most frequently defended. They are, however, in fact the ones in which the distinctive contribution of teleology is the most difficult to pick out. I want, therefore, to begin with the first type; and, before, looking at functional explanations of particular organs and systems, to give a general defence of explaining events and processes in the life of a plant

or animal with reference to the mature state characterized in that creature's *logos*.¹⁸

SELF-MAINTAINING SYSTEMS¹⁹

An animal or plant is an organic whole, a complicated system of interrelated capacities, most of which tend, in one way or another, to promote and maintain the mature functioning of an organic system of that sort, and/or to perpetuate the system beyond the individual life by reproduction. This capacity—to maintain functional states through self-nutrition and to propagate them through reproduction—is the mark that sets off the living from the lifeless. “By life we mean self-nutrition, growth, and decay” (*DA* 412^a14–15). “The living, *qua* living, is a self-nourishing body, so that food is essentially, not accidentally, related to the living” (416^b9–11). Self-nutrition, with reproduction, is “the first and most common capacity of soul, the one

¹⁸ Aristotle will speak here only of living beings. This restriction is defended below.

¹⁹ On this and the following section, cf. especially Wright, “Functions”; Boorse, “Wright on Functions”; Cummins, “Functional Analysis”; Ruse, “Functional Statements in Biology”; Canfield, “Teleological Explanation in Biology”; Scheffler, “Thoughts on Teleology”; also Beckner, “Function and Teleology”; Hempel, “The Logic of Functional Analysis”; E. Nagel, *The Structure of Science*, chapter 12; Sorabji, “Functions.” Aristotle’s position, I shall argue, is closest to the one defended by Boorse and Cummins, both of whom insist that a functional explanation of a part *x* is part of an analytical answer to a question about the whole system *O*—how does *O* work?—and not, except secondarily, an answer to the question, “Why is *x* there?” or “How did *x* get there?” (Contrast Wright, who nonetheless makes some important observations about the relationship between functional analysis and evolution.) Boorse argues that functional accounts are appropriate only to goal-directed systems—i.e., to systems that display appropriate behavior modifications within some range of environmental variation (78–80); cf. also Ruse, whose notion of “reproductive fitness” is, however, much narrower than Aristotle’s nutritive-reproductive *psuchē*: we can still talk about the functions of parts of a mule, although the animal is sterile, because it remains (numerically, if not in species) a self-maintaining organism.

in virtue of which life belongs to all that has life” (415^a24 f.).²⁰ As we shall see later, to ascribe to a creature the capacity for self-nutrition is also to ascribe to it a certain plasticity of behavior: in a variety of circumstances (though always within natural limits) it does what is appropriate to maintain its states. An icicle grows by absorbing material from the environment; a fire “nourishes” itself by consuming surrounding matter. Yet we do not call these living, because there appears to be no selectivity, no capacity to vary behavior with changing circumstances; this behavior is explained by the laws of matter alone. A plant, on the other hand, turns and grows now this way, now that, depending on the location of the sources of light and water, limiting its growth as the life of the whole system requires. An animal does not eat just any object in its environment; it selects the food which is appropriate to maintaining its organic states. This plasticity is part of what we mean by self-nutrition; previous thinkers who made perception or motion the characteristic mark of *psuchē* failed to see that it is basic to our ordinary notion of life. Numerous organisms that neither perceive nor move are still counted by us as living because their behavior displays appropriate variation directed at the end of keeping the creature (and, beyond him, the species) alive. The parts of a plant, like the parts of an animal, are for-the-sake-of life (416^a17–18).

The capacity for self-maintenance is the “first soul” not just in the sense that it is most basic, or lowest; it is also most central, “most general” in the sense that it in a way encompasses and subsumes all the others. For when we give an account of perception or motion, we do so in terms of the basic ends of self-maintenance (nutrition) and reproduction.²¹ All the more specialized capacities are to be explained functionally, as tending to promote life. The perceptive capacity is one part of an analyti-

²⁰ On reproduction, *DA* 415^a25–26.

²¹ This will not, of course, be true of god or the heavenly spheres, and this may be the reason that, at 413^a22 ff., Aristotle proposes a different account of life: if only *one* of the life-capacities (intellect, perception, nutrition, etc.) is present, the creature is called living.

cal account of the nutritive capacity (as well as a part of the *logos* that we give when we ask what "self" the nutritive capacity is to preserve). If we ask why animals perceive, we will get an answer that shows how perception is, in certain animals, necessary for survival and reproduction (*DA* 434^a30 ff.). If we ask why animals preserve themselves or reproduce themselves, we hear only that this is "the most natural function" in living beings (415^a25 ff.), that this is what it is to be alive (412^a14–15).

Now if animals and plants are self-maintaining organisms whose behavior tends to promote their life and states, we might expect that the best explanation of any particular process or piece of behavior will be one that takes this into account, showing what part the particular activity plays in the overall pattern of the organism's self-maintaining activity. It must have two parts: (1) a specification of what it is to be that sort of creature—the *logos*, which describes in a general way the form or functional organization of a normal adult of that species; and (2) an analytical account that shows how a particular process or organ contributes towards the realization or maintenance of some component of the *logos*. The *logos*-state, a certain functional state of potentially living matter, is the goal or end with reference to which growth and particular bits of activity are to be explained:

For coming-to-be is for the sake of being (*ousia*), not being for the sake of coming-to-be. . . . Hence we should, if possible, say that because this is what it is to be a man, therefore he has these parts; for he cannot be without them. . . . And because he is a thing of this sort, his coming-to-be must happen the way it does. And that is why this part comes to be first, and then this (*PA* 640^a18 ff., cf. *GA* 778^b3 ff.).

Such an account appears to have two important advantages over an efficient-causal account of the form "A happens after C of necessity": (1) The teleological account, unlike the efficient-causal one, sets the process to be explained in the wider context of an integrated pattern of behavior, showing how it is

related to other systems and activities of the creature. Empedocles' account of animal development ("many heads sprang up without necks," etc.) suggests that we can describe growth by characterizing the interactions of limbs and parts in isolation from a growing whole. But at any stage in the process of growth, what we have is a whole, an organic creature of a certain sort; and the *logos* of what it is to be that sort of creature is crucial to us in explaining and predicting how growth will go.²²

(2) These considerations might not tip the balance in favor of a teleological account, if animals and plants were not plastic and self-maintaining: for then, given a suitable amount of information about the initial state and the laws of efficient-causal interaction, we would be able adequately to predict or explain the outcome. But for living beings as we know them, the teleological account that begins with the creature's *logos* is superior in generality and predictive value. In a wide range of circumstances, an animal or plant responds appropriately, so as to fulfill or maintain some part of its *logos*. As the circumstances change, the behavior, and the efficient-causal laws that explain it, change also. What remains the same, and unifies the various cases, is the teleological law that the behavior is whatever will promote the flourishing of the mature organism. Empedocles argued that the growth of plants was to be explained solely by the laws of matter: the downward rooting because earthy matter travels down, the upward branching because fiery stuff travels up (415^b28 ff.). But this fails to explain why it is that, when the sources of water and light change position, the rooting and branching change also; and why the growth does not go on within limit, but only as far as is compatible with the health and life of the whole organism (cf. 416^a8–18). The material laws may be a concurrent ex-

²² *Ph.* II.8, 198^b23 ff.; and also *PA* 640^a19 ff., where Empedocles is again accused of explaining development piecemeal and of not recognizing that what comes to be is, at any stage in the process, an organic whole: "the seed which gives rise to the man must to begin with have a capability of a certain sort." Cf. Clark, *Aristotle's Man*, 50–64, and, for a similar argument, Mackie, *The Cement*, 273–74.

planation of plant-growth, but the primary explanation is provided by soul (416^a14–16)—by a functional account that tells us that in a variety of circumstances that plant will root and grow in the way best suited to its continued life and growth—that the growth is “better so—better not simply, but with reference to the nature of each thing” (*Ph.* 198^b8–9).²³ Instead of a separate story for each part and system, we have an account that shows how each system contributes to the interlocking functioning of a whole organism, whose states (as a whole) most of its behavior seeks to perpetuate. Instead of a conjunction of efficient-causal sequences (In C_1 , plant O does x_1 ; in C_2 , O does x_2 , etc.), we have the simple law—from which, unlike the conjunction, we can make predictions about new situations—that in $C_1 \dots C_n$, O will “choose” (within natural limits) whatever behavior will bring about y , where y is some component of its *logos*.²⁴ Empedocles’ accounts imply that the growth and development of bodily parts is a matter of chance interaction; but “all natural things either invariably or normally come about in a certain way” (*Ph.* 198^b34–6)—the way that promotes the *logos*, which should be the beginning of a scientific account. “Things exist by nature if, starting from some internal starting-point, they arrive by a continuous process of change at some end-state. Each starting-point gives rise, not to the same thing in all cases, nor to just any chance thing, but always to something *proceeding towards the same thing*, if there is no impediment” (*Ph.* 199^b15–18). The *logos* is the end-state which provides a unified account of adaptive behavior.

²³ Cf. also *Ph.* 199^b9–13, where the organic unity of plants (we do not see “olive-headed vinelets” growing from seeds) is used as an argument against Empedocles’ theory of animal reproduction.

²⁴ Cf. Taylor, “A Reply,” 141–43; “Explanation of Purposive Behaviour,” especially 58–59; Mackie, *The Cement*, 278. Taylor sometimes seems to confine the argument to genuine cases of purposive behavior; Mackie is closer to Aristotle, extending it to animal behavior which “invites purposive description” (275). Real animals will, of course, have complex and sometimes conflicting goals in view; this vastly complicates the problem of explanation and prediction—cf. Scheffler.

FUNCTIONS

It is now worth looking more closely at some cases where I ascribe a function to a bodily part in order to be more precise about what such claims imply. Plato, in *Republic* I, suggested a three-part account of functions, from which I feel it important to distinguish my account. He suggested that the function of a part or an artifact is (1) what it alone does, *or* (2) what it does best, *or* (by implication) (3) what it is designed to do (352e–353a). These criteria pick out different functions; and Plato nowhere tells us the point of giving functional accounts, what they are supposed to explain. To take an example: the heart makes a thumping noise; it is the only organ in the body to make a thumping noise; but nobody would say that its function was to make noise, rather than to pump blood. Plato’s account, however, admits both as functions.

The first thing to notice about my functional accounts is that they are always given with reference to a containing system—they say “the function of x is y ” “not simply, but with reference to the nature of each thing.” This means that functional accounts are useful primarily for systems of living bodies; they can be applied to artifacts only derivatively, and by regarding them as extensions of the living body—like the stick in *MA*, chapter 8, whose function is to help the man to walk and which “becomes like a separable limb.” Plato’s pruning-knife, and other detached artifacts, have a function only with reference to the needs and desires of the beings who use them. In animal organisms, we can ask, given a creature of a certain type, what the functions of various systems and parts are in its self-maintaining activity. What we cannot do is (1) to ask what the function of self-maintaining itself is (that we take as given, and as “most natural”), or (2) to ask what the function of a certain type of animal is, in some larger scheme of things. That is the cosmic teleology of design of which I have often been accused, but of which *Ph.* II.7–8 and hundreds of examples ought to acquit me.

A request for a functional account is not a demand to know

how the heart got into the lion or why this bone is here rather than there.²⁵ There is some evidence that systems and structures *did* get the way they are by altering in response to environmental change, and then being transmitted in changed form to offspring; and this, if true, would give functional accounts an added aetiological value for the physiologist.²⁶ But the main thing that we demand when we ask for the function of *x* is an analytical account that begins with the animal's *logos*, and goes on to say what systems and parts enable animals of this sort to maintain themselves and how these are interrelated. This happens on two levels:

(1) On the formal level: we list what I shall call the "constitutive activities" of the animal and show what contribution each of these makes to self-maintenance. We do not mention matter, except to say that this function is necessarily realized in some sort of suitable matter. Constitutive activities are all those activities that enter into the best specification of what it is to be a certain sort of animal; these also, in most cases, enter into the best analysis of how animals of this sort nourish themselves and reproduce.²⁷ For example: the perceptual system is constitutive of what it is to be an animal; and there is also a functional account of perception (cf. *DA* III.12) that shows how perception contributes to an animal's self-nutritive activity.

(2) When we have enumerated the constitutive activities, we still know comparatively little about the biology of par-

²⁵ Cf. Cummins, Boorse.

²⁶ This is the contribution of functional accounts stressed by Wright; for some criticisms of his account of evolutionary theory, cf. Cummins, 750–51; more general criticisms are in Boorse, 70–77.

²⁷ It could be objected that a great many characteristic activities, especially of the higher creatures, do not contribute to self-maintenance or reproduction; the purely theoretical intellect is the most striking example. Aristotle would hold that *most* activities are somehow connected to the "nutritive soul"; in the case of intellect, he could refuse altogether to give its purely theoretical exercise a functional account, or he could make an exception to the usual rule that functional accounts are relative to nutrition and reproduction.

ticular animals. We know what systems they have, and that these are realized in some sort of suitable matter. But this will not help us if, as doctors or scientists, we want to know how these activities actually go on in particular living creatures. For that, we need to move to the level of contingent material realizations of functional states. For nutrition to take place in higher animals, there must be a system which transports nutrition to different parts of the body: the circulatory system. The operation of this system requires something to transport the nutritive material, and a pump to cause the transporting medium to move. This pump, in most of the higher animals that we actually observe, is the heart. Then the function of the heart in higher animals is to pump the blood. The heart does other things as well: it makes a thumping noise, it leaps from fright (cf. *MA* 11, *DA* III.9). But these do not enter into the analytical account of the animal's self-maintaining activity. If the heart did more than one thing that did figure in such an account, it would have more than one function. (Some bodily parts appear to have no function. "There is no reason to look for the for-the-sake-of which in all (bodily functions); some are there for something, and many others are present as a result of these" (*PA* 677^a17–19)).²⁸

Clearly the heart is not *necessary* for the performance of the circulatory pumping. When I so frequently use the phrase "the *x* or its analogue" I am emphasizing that we are interested in a functional state of the organism, which is realized in some suitable matter or other. An artificial pump might perform the heart's function, whereas a non-functioning heart would be only homonymously a heart. But it is also true that as doctors and biologists, we are interested in knowing what particular organs in creature *O* usually realize their various functional states. Thus, though the heart is proper cause of circulation, not *qua* heart, but *qua* pump,²⁹ we still are interested in knowing that in normal circumstances animals in species *O* have hearts, not metal pumps, to do the pumping.

²⁸ Cf. the discussion of *GA* V.1 in the section on necessity, pp. 92–93.

²⁹ Cf. *Ph.* II.3, 195^b3 ff.

When I say, "The function of x in O is to y " (and x is an organ or physical system, not a functional state), I mean, then:

(1) That y is a "constitutive activity" in the system O (an activity which would be mentioned in the best analysis of how O maintains and reproduces itself).

(2) y is an ongoing or regular activity of x in O (to eliminate cases in which a part performs a useful function by accident or sporadically); x has a stable disposition to y in O .

(3) x or some functional analogue of x is necessary for y -ing in O .³⁰

(4) Under normal circumstances x is necessary for y -ing (or good y -ing) in O 's as normally constituted.³¹

Functional accounts will be more informative the more complicated the system being analyzed, and the greater the difference in complexity between the analyzed system and the organs or systems mentioned in the analysis. The functional analysis of a simple plant is less revealing than an analysis that breaks down a complicated human organism into much simpler systems and organs and tells us their roles in the functioning of the whole.³²

In addition to its analytical value, a functional account of a

³⁰ This is not as empty a requirement as it might appear to be. We can say something about what any pump must be like (in terms of large-scale structural laws, specification of division into moving and moved parts, etc.), beyond the bare claim that it must be something suitable for pumping.

³¹ A problem arises for cases in which two or more organs of the same type generally contribute to the performance of the function, though one alone would be adequate: e.g., the kidneys, the teeth. We would not usually say here that, e.g., the function of the *left* kidney is to eliminate wastes from the blood. Aristotle never, so far as I have been able to determine, makes a claim of that form; instead, he ascribes the function only to the whole system that is required for the proper performance of the activity—the teeth, the blood vessels, the bones—and ascribes to individual parts only some contribution unique to that part. There will, however, be cases where we will want to say that the presence of, e.g., one of a pair of co-functioning organs is necessary to ensure the *good* performance of the function.

³² Cf. Cummins, 764.

system or organ may, as I suggested, have some aetiological force: it may say something about why that part is there in the form in which it is there.³³ Animals are not only plastic as individuals; they also adapt in more lasting ways to changes in environment. Desert mice develop digestive systems that enable them to go without water in the summer; if they drink the amount of water that regular mice do, they die (*HA* 606^b23). Cattle develop humps in environments where long-term food storage is necessary (606^a12 ff.). In cases like these, we can explain the physiological differences between the desert creatures and their near relatives by citing the usefulness of their adaptations in preserving life and health. A functional account of a desert mouse's water-system not only forms part of an analysis of that mouse's nutritive-reproductive activity for the sake of its *logos*; it also shows us something about the history of this system, and tells us why it is there, why it differs from isofunctional systems in other mice.

TELEOLOGY AND INTENTIONALITY

I have now considered the first and most general form of teleological explanation: " x happens for the sake of y ," or "The function of x is y ." The defence of this sort of account against atomistic reductionism is predicated, first, on my general defence of explanations on the formal-functional level, rather than on the level of ultimate matter; second, on my account of living beings as essentially and primarily self-maintaining organic systems. Teleological accounts show the relevance of an organ or a process to this self-nourishing activity, and contribute to an analysis of it. They are therefore more general than efficient-causal accounts, and, because they take account of plasticity, more economical. But there is a second kind of teleological account whose distinctiveness may prove harder to understand. "He does x for the sake of y ." "All animals move for-the-sake-of something." Here, the y is a goal as seen and

³³ Cf. Wright, and the criticisms cited in n. 26 *supra*.

described from the (animal) agent's point of view. We are explaining his activities not just as tending to bring about a natural goal or end that is a component of his *logos*, but as tending to reach an object which is, for him, an object of desire. All desire is for-the-sake-of something (DA 433^a15); the first mover of the animal is the object of desire (433^a20, 433^b11); and the faculty of desire, together with the cognitive faculties that present the object to the creature, is central in the explanation of animal motion (433^b12). In both DA III.9–11 and MA 6–7, it is clear that I believe that all animal movement involves desire and that the teleological account of that motion should be a subjective one: it should begin with the animal's own *phantasia* of his goal.³⁴

I have defended the superior usefulness of teleological accounts with reference to the animal's regular, self-maintaining activity. The account defended was the scientist's best analysis of its various systems and their interlocking contributions to this activity. But what can we say of teleological explanations such as, "He ran to the sheepfold to get meat," or "He threw the stone to break the window"? In the first case, and in most non-human cases, the defence will go very much as it did above. Animals do not seem to have desires and intentions that are not in some clear way related to self-maintaining. Whenever the animal's perceptual activity leads him to suppose that there is meat, he goes to get it, though this may, in different circumstances, require quite different sorts of behavior. The way the food-getting mechanism functions in a lion is via that lion's beliefs and desires. A plant takes in food that comes into contact with it; it does not have to perceive it, form beliefs about it, or go to get it. Some might argue that animals are, in much the same way, creatures of blind response, automata whose motions are to be explained by simply citing the stimuli to which they are exposed. I argue that even the lowest animals, the "incomplete" creatures who have only "indefinite" motions, must, if they do move from place to place, be described as intentional

systems: their *phantasia* of the object, and not simply an objective characterization of the object, is what enters into the best explanation of their motions (433^b31 ff.).³⁵ If they see the meat as meat, they will go towards it; if they mistakenly believe it to be some harmful substance, they will run away. Their desires, their view of the object, and their beliefs about what must be done if the object is to be attained, determine the course that they will follow.³⁶ And a teleological account that says that in a variety of circumstances the animal will do whatever he believes will lead to G, some significant goal or *logos*-constituent, remains superior for the reasons we have cited to a messy conjunction of efficient-causal accounts.

But a difficult problem remains. The defence so far has presupposed that the goal G is some constituent of the animal's *logos*, some state it strives consistently to realize. We may fairly safely assume this for most animal movements. (In fact, since these creatures are without language, we ascribe beliefs and desires to them only because their behavior exhibits this teleological regularity.) But many of the intentional activities of human beings (e.g., our second example above) do not bear any obvious connection to self-maintenance; sometimes they are directly harmful to self-nutrition and life. We still, however, use intentional language to explain them. Is there any rationale for this in terms of generality and economy? Granted that a low-level atomistic account is inferior, could we not construct a causal account in terms of the antecedent activity of the man's beliefs and desires?

First, we must insist that most human actions do tend to realize some means to or component in a system of ends; and if we know something about a particular agent's system, we

³⁵ For further comments on this passage, cf. Essay 5 and the note on 703^b2. Plants are not credited with *phantasia*, probably because a plant's self-nutrition does not seem to require a selective sorting-out of its environment, as does an animal's. Direct sensation of the "proper objects" of the sense of touch seems to be sufficient for ingestion.

³⁶ On the application of the "practical syllogism" to animal activity, see Essay 4.

³⁴ Cf. Essay 5.

can have fair success predicting its activities. But for actions that are not systematically end-directed, we can still defend the teleological account. If the proposed causal account in terms of antecedent desires and beliefs is to be a genuine alternative to teleology, it must be possible to identify the desire and the belief independently of the goal. To ascribe to the window-smasher a desire to smash a window and a belief that if the window is to be smashed a rock must be thrown is to give a teleological account: we begin with a goal, and show how the agent does what is, in the circumstances, necessary to realize it. The desire and the belief are not genuine Humean causes. The connection between them and the goal is a logical or conceptual one; the relevant characterization of the motivating desire must contain a reference to the goal (as seen by the desiring agent). There is, for this reason, no genuinely efficient-causal explanation of intentional activity that remains on the formal or functional level.³⁷ We can, it is true, always move down to the material level, where there will always be *some* physiological state or other in which desire or perception is realized; and these states, if we could pick them out properly, would be Humean causes. But there probably will not be stable or constant relationships between the two levels. A form-type may be instantiated, in different animals and at different times, in various different sorts of matter. Hence there seems to be no way, even in cases of intentionality where self-maintenance is not in view, to move away from teleology without incurring the objections I directed above against your ultimate-particle accounts.

TELEOLOGY AND NECESSITY

Democritus has, all along, been grumbling, like Thrasy Machus in *Republic* I—all the more since Aristotle is so much more prone than Socrates to *makrologia*. But at this point he nonethe-

³⁷ This claim is elaborated in Essay 4; Aristotle's view of this question closely resembles that of von Wright in *Explanation and Understanding*, which is also discussed further there.

less decides to accept unchallenged what he has heard so far and to press for further clarification.

D: Aristotle, I am not really persuaded by all this. But let us assume for now that this is a compelling account. I still wonder whether it is a consistent reconstruction of the account you actually present in your writings. I have three questions to raise: one about your odd notion of the hypothetical necessity, and then two about points that, for the sake of argument, I conceded to you earlier: the applicability of teleological explanation to the non-living, and the question of a teleology for the universe as a whole.

As I understand it, you tell us that there are two ways of explaining a natural process, e.g., respiration. One way is to explain it functionally, saying what role it plays in the larger pattern of activity of the living being. Another is to mention the particular material interactions which usually realize this process in the animals we are studying (cf. *PA* 642^a32, *DA* 403^a29 ff.). The *MA* is the most elaborate and striking case of this: you say that from one point of view, animal motions are "for something"; and you give us, in chapters 6–7, a functional account beginning with the object of desire and going through perception, desire, and consequent action. But all these functional states are states of matter; and in chapters 7–8 you take a look at the particular material interactions that always or for the most part, in the animals you are studying, constitute perception, desire, etc.³⁸ These physiological processes follow one another of necessity, as do the movements of the parts of automatic puppets. What I want to know is, just what *is* this necessity, and where does it fit in your accounts of the various necessities (e.g., *Ph.* II.8–9, *GA* V.1, *PA* 642^a1 ff.). Is the necessity of the material interaction "simple," or "hypothetical"? And if the latter, doesn't this mean, after all, that we have

³⁸ Barnes, "Aristotle's Concept of Mind," argues that Aristotle is a non-physicalist about desire as well as about *nous*. The opposing view is argued for in Essay 3.

to introduce an extra entity into the process to explain the result, e.g., by supposing goals to have a mysterious *a fronte* causal power? I do not really think this is what you are after, as I have already said; but I shall ask you what you think of one critical account that I have heard. According to this interpretation, if the necessity of the material interaction were a simple necessity that determined the outcome, teleology would be otiose. "If the action of heat is absolutely necessary, what further meaning is left for [the final-cause account]? We should have to suppose that a ghost in the machine switched the heat on and off, but in that case, what becomes of the absolute necessity?"³⁹ This critic's solution is to insist that all necessities in natural beings are hypothetical, not simple: by themselves they do not account for the process, any more than the building stones do for the formation of a house.⁴⁰ Now to me this seems rather confusing. First, it takes what you say about the relationship between material *constituents* and formal entities and tries to apply it to what you say about the relationship between the necessary *interactions* of these constituents and the process, *formally* described. Second, it does not really seem to solve the problem found: for if the antecedent causal factors are not sufficient to produce the result, we will, after all, have to invoke some non-physiological entity which interacts with them. To say, "If there is to be *y*, then there must be *x*," does not seem to help us cross the efficient-causal gap without employing the extra factors that were apparently rejected. But tell me what you make of this, and how the distinction between two sorts of necessity does enter into your account.

A: I am glad you dissociate yourself from the criticisms you report; and you make some preliminary distinctions which

³⁹ "Democritus" here refers to Balme, *PA-GA*, 79. (The view defended in his *Aristotle's Use* is, I believe, much more compelling.) Compare Charlton, *Aristotle's Physics I-II*, 126: "Can our movements be explained mechanically by action on our sense-organs? If so, pursuit and avoidance are epiphenomenal; if not, our movements are for something."

⁴⁰ Cf. *GC* II.11, 337^b14 ff.

will be helpful. First: it would be quite true to say that all material necessity is hypothetical and not simple—if what is meant by that is that the *constituents*, as such, don't explain the structure that is made from them, that a simple enumeration of the material parts of an artifact or a living being tells us little without an account of their organization. This is what I indicated in the *GC* analogy, and again in *Ph.* II.7, when I characterized the material (or constituent) explanation as "if so-and-so is to be (as the conclusion out of the premises)" (198^b7–8). This analogy is crucial: for the conclusion does *not* follow of necessity from one premise, from two premises in isolation, or from the premises incorrectly combined. But it *does* follow of necessity if the premises are all there and put together in the right way. So, too, the constituents simply, or taken as a heap, are only what must be there if there is to be a lion; but all of them combined in a certain way *are* that lion. The form is not, I insist again, a separate element that must be added to the materials to make up the whole.⁴¹

Next, the question of processes. Perception is a process that has a certain role in the total life-pattern of the organism; it is also necessarily enmattered, so that any occurrence of it will have *some* physiological description. And for the most part, in higher animals, it is realized in some sort of *alloiōsis*, or qualitative change. Thus we can also, as biologists, say "this after this of necessity" (*Ph.* 198^b6): at the same time as we give a general teleological account of perception, desire, and action, we can also, for medical and biological interest, give an account of what typically happens, physiologically, in terms of the necessary interactions of the hot and the cold, etc. A biologist will want to give both accounts, where both are applicable, for beings that are "for something" come-to-be "not without things

⁴¹ The *GC* passage is actually more complicated than this indicates; but the distinction made there and elsewhere between the necessity that holds among eternal objects and the necessity that holds in the sublunary realm seems to be a distinction between exceptionless regularity and variation (a man might go for a walk or he might not), not one between susceptibility and non-susceptibility to causal explanation.

having a necessary nature" (*Ph.* 200^a7; cf. 198^b5–9).⁴² "Nature in one sense acts for the sake of something, in another sense of necessity" (*APo* 94^b36–37).

But it is one thing to say that functions are realized in some material efficient-causal sequence that goes through without causal gaps according to the necessary laws of matter, and quite another to hold that this makes functional accounts otiose. I hope this is clear by now. It can sometimes be essential to have the physiological account—as when a doctor learns how to treat patients by getting the best physiological description of the functional state, health (*APo* 94^b19 ff.). But if we are going to give such accounts, we must know what it is we are explaining; we can use matter most efficiently in explanation if we incorporate the "this out of this of necessity" into a teleological account which tells us what functional state is being described and what role it plays. Here hypothetical necessity enters again. An account in terms of "simple necessity"—one that cites the material interactions without incorporating them into any formal account—could be singularly uninformative. There are some animal features for which such an account is all that can be given. To explain the formation of an eye, we can and do give a functional account that shows how eyes work in animals and that cites the material interactions as hypothetically necessary for the realization of the end.⁴³ But the fact that the eye is blue or brown cannot be explained in an any more interesting or general way than as the necessary result of the interaction of such-and-such constituents (*GA* V.1); blueness bears no relation to the creature's *logos*. The contrast between the two sorts of necessity, then, is one between the material factors viewed in isolation and the same factors incorporated into a teleological account. The explanation according to simple necessity is adequate for certain phenomena, but inadequate, alone, for significant processes in living, natural bodies. "The natural scientist should give both explanations, but especially the one for-the-sake-of something; for it is this that explains the matter,

⁴² Cf. also *PA* 642^a35.

⁴³ Cf. Wicland, 149.

and not the matter the end-state. The end-state is the for-the-sake-of which, and the beginning (sc. of explanation) is from the definition and the *logos*" (*Ph.* 200^a31–35). When we know what a lion is, we can see what matter is required; but an account of diverse material interactions will not yield a general account of lion behavior.

TELEOLOGY AND THE UNIVERSE

D: So far, Aristotle, you have spoken only of living beings; you have based your entire defence on your characterization of what you call self-maintaining systems. But many of your students believe that you extend teleological explanation to the lifeless as well; even your sympathizers find this a great flaw in your account.⁴⁴ I myself do not see that this is the case; I believe that are they confused by the fact that you clearly apply teleological explanation to the heavenly bodies. But, of course, you consider these to be living and propelled by desire. This, I think, is a very peculiar move on your part—for it is hard to see in just what sense the perfectly consistent activities of the *primum mobile* could be called plastic or self-maintaining.⁴⁵ But to convict you of drawing the boundary between the living and the non-living oddly is not to show that you extend teleology to inert matter.

A: It is quite true that I believe the heavenly bodies to be living and to be moved by desire; and I often invoke teleological accounts for artifacts—assuming, as I have said, that the goal in question is a human goal. But the idea that I think natural phenomena—eclipses, rainstorms, the downward motion of earth, the upward motion of fire—are best explained teleo-

⁴⁴ For example, Balme, 6; and Ayala, 15: "His error was not that he used teleological explanations in biology, but that he extended the concept of teleology to the non-living world."

⁴⁵ Cf. Essay 2 for further comments on this.

logically is a misconception that I try frequently to avoid—one that has, no doubt, seriously impeded understanding of my real arguments for teleology. One prominent opponent of teleology has even ascribed to me the view that a falling stone *desires* to reach its natural place and feels “jubilant” as it nears the goal. This is an extreme, but not far enough from the norm.⁴⁶ The very opening of my account of teleology in *Ph.* II.8 cites the example of rain as an *illegitimate* case of teleological explanation; and the rest of the discussion argues that the “for-something” is present first and most obviously in animals, but also in plants, “although there it is less clearly articulated” (*Ph.* 199^{b9} ff.). The argument for finding it in plants refers to their organic unity, their coherent development towards a mature form. Again, *Metaph.* 1044^{b12} cites an eclipse as an example of an occurrence that is *not* “for something.” To explain the downward motion of a stone, we need mention only its own matter (*APo* 95^{a1}–2, *Ph.* 200^{a1}–5) or an external source of change that constrains it (*APo* 95^{a1}); changes of natural bodies (the elements or their compounds) are regularly explained with reference to underlying matter alone (*Meteor.* 378^{b31}–34; cf. *MA* 703^{a26}). Furthermore, *Ph.* VIII and the *MA*⁴⁷ clearly ascribe self-motion only to the living, arguing that the motions of lifeless things are explicable, ultimately, with reference to the goal-directed motions of living beings—animals or the heavens. Lifeless things are said in *MA* 6 to have *peras* (in the sense of “end,” *telos*) only inasmuch as they are moved, ultimately, by living creatures, whose motions all have *peras*. Non-living natural bodies do, of course, have a preferred state: rest in their natural place. There is no reason, however, to suppose that the regularities in these motions cannot be accounted for by material laws alone.

⁴⁶ The “extreme” view is attributed to Aristotle by Skinner, *Beyond Freedom and Dignity*, 6, on the authority of Butterfield’s *The Origins of Modern Science*. Exceptions to the general tendency to misinterpretation are Charlton, who has a very clear and thorough discussion of the question (116–18), and Wieland, 159.

⁴⁷ Cf. note on 700^{a11} ff.

D: One further question, and I shall, like Thrasy Machus, “become tame and stop grumbling.” Do you believe, after all, that there is any reason to suppose that the ends of some creatures subserve those of other creatures, that there is a universal teleology of nature? I dismissed these points earlier; but there are, in fact, just a few passages that cause me difficulty: *Pol.* 1256, your account of the shark’s teeth, and some of your comparisons of Nature to an artisan.

A: I went out of my way to insist in *Ph.* II.7 that teleological accounts say that something is “better so—not simply, but with reference to the *ousia* of each sort of thing” (198^{b7}–8). I meant this to rule out the universal teleology one finds in Plato.⁴⁸ When I use the metaphor of Nature as craftsman, I usually accompany it with appropriate warnings that we are not to view nature as anything separate from natural things, or to interpret the image as finding an overall purpose in the cosmos.⁴⁹ At *PA* 696^{b26}, I do claim that sharks have their teeth underneath not only to prevent them from overeating, but also to save other animals (*soṭērias heneken*).⁵⁰ This was perhaps a careless piece of writing; but all that was meant was that the *result* of this morphology was that other animals were saved—that this safety would have been jeopardized had there not been such a structure. The *Pol.* passage seems to be a more serious problem; it says not only that plants are for the sake of animals, animals for the sake of men, but also that if Nature makes nothing in vain, she must have made all of them for the sake of men (1256^{b11}–22). This does seem to claim that the existence

⁴⁸ Cf. *Phaedo* 97 b–98 b, *Laws* 886 a. Aristotle’s arguments for the unmoved mover do not rest on teleological considerations, although the *De Philosophia* (frs. 12a, 13, 17 Ross) show that he was familiar with such arguments for divinity; cf. Wieland, 158–9.

⁴⁹ Balme has a good discussion of Aristotle’s use of the metaphor of Nature as craftsman at *PA-GA* 94–95.

⁵⁰ Cf. *Ibid.*, 96.

of animals and plants cannot be satisfactorily explained with reference only to the *logos* of their own species. But in defence I shall say only that this passage is from an introductory section of the work, a section concerned with stating the appearances; it assumes an anthropocentric vantage point and asks what use various parts of the natural world are to man in his efforts to establish himself in the world. It is a preliminary *phainomenon*, from the human-practical viewpoint, not a serious theoretical statement.⁵¹ Surely it is very little on which to build a case for inconsistency.

I am not, however, entirely unwilling to talk about the interrelationships of living species, and the order of the whole universe. In *Metaph.* XII.10, I make use of the following image of universal order:

All things are in some way ordered together (*suntetaktai*)—things that swim, things that fly, things that grow—but not all in the same way. And it is not the case that one thing has nothing to do with another; there is a connection. For all are ordered in a single system⁵²—as in a household, where the freemen are least at liberty to act capriciously, but all or most of their actions are ordered, while slaves and beasts contribute little to the common good, but do most things capriciously; for such a principle is the nature of each. I mean, for example, that all must be dissolved into their component elements, and there are other ways in which all contribute to the whole (1075^a16–25).

The universe is an interlocking, orderly whole, in which each

⁵¹ Cf. Wieland, 159.

⁵² Ross translates *pros hen* here as “to one end.” But this is not the standard meaning of the expression in Aristotle’s writing. (*Ph.* 199^b15–18 used *epi* to express teleological directedness.) *Pros hen legomena* are terms showing some systematic interconnection, not terms pointed towards a single goal. (Cf. Owen, “Logic and Metaphysics.”) The focal *hen* in the case of the universe is, no doubt, god, but to call him a focal point in an organized system is to say only that to explain any motion in the system we must, ultimately, refer to him, not that he is a goal or end of all motions.

species contributes to the good of other species and in which all depend for life and growth on the consistent movements of the heavenly bodies. If we want to know the necessary conditions for any animal’s fulfilling its *logos*—and hence the factors that, in their absence, may prevent fulfillment, we have to look at the activities of other beings. If the spheres are compared to masters, men and animals to slaves and dogs, it is not because men and animals exist only to serve the gods, but because men and animals cannot live without the heavenly bodies, whereas the heavenly bodies have no external needs; and because the motion of the heavenly bodies is perfect and unimpeded, whereas men and animals have many unfulfilled wants because of the nature of their dependence on the external world. In the case of man, to have unfulfillable yearnings is even a salient feature of his *logos*. But all these interdependencies do not imply that the universe as a whole is an organism with its own *logos* and its own good;⁵³ all enter quite naturally into the explanation of how living beings of various types try to fulfill their natural needs and to attain the best functional state specified in their *logoi*.

It would be stirring to close with a burst of Platonic rhetoric about the good itself, and the relationship of all things to eternal and separable beauty. It would be rousing, too, to end with a call for scientific enlightenment, for progress beyond the confusion of the appearances towards a solid, more certain, physical reality. You and Plato appear to be deadly enemies—he with his defence of the good and the end, you with your physicalistic mockery of final causes. But you share a certain picture of philosophical progress, on account of which you will both be

⁵³ This position is argued very obscurely by Clark, 59 ff. His only clear “evidence” comes from the *Timaeus*, and he concedes that “Aristotle only once, in the extant works, likens the universe to an animal and that in an *aporia*.” (The passage in question, *Ph.* 252^b24, only remarks that if animals can initiate motion in themselves from a state of rest, perhaps the universe, being a large ordered system (*kosmos*) can too.) Of course if Aristotle had had and used the notion of an ecosystem (as he did not) such uses of teleological language would not be amiss. Cf. Boorse, 84–85.

unable to accept either my methods or my results. You share a disdain for the appearances and a determination that true philosophy, or, in your words, scientific, discourse must be about a solid, changeless realm beyond the shifting and indefinite terrain of *nomos* or human interpretation. Behind the *phantasia* is a reality more beautiful and more secure. This little discussion of the end must have been disappointing to you—although you listened most politely and did not, despite your comparison, show the bad manners of a Thrasymachus. But, then, Plato's spirited citizens are dogs who are tame to those they know; and the argument must have seemed to you like an old acquaintance, resting, as it does, on the most ordinary of our everyday accounts of animal motion, and on a picture of the difference between the living and the non-living that is far older than Homer. I began with the *Iliad* to indicate that we were in for something rather old, shopworn, familiar—only a lion going after some meat, not immortal forms, or fascinating little particles. The argument claimed that we have not moved beyond Homer in explaining animal motion—although it may be that we are now able to give a clearer account of what he is doing and to defend his picture from some objections. And you will have noticed that my little speeches even fall short of Homer with respect to power and dramatic force, as they also fall short of Plato's grandeur and your epigrammatic wit. They are plain, shabby things in every way, and you appear, if tame, to be bored by the result.

But if you have followed the argument closely, you will, I hope, come to see that it is not a trivial one, and that even in the rather ordinary realm of the apparent, some order may be found. I can do no better than to end with a story that I used once before—you may remember—in a rather different context.⁵⁴ Some students of philosophy once travelled a long way to see Heraclitus. When they arrived, they found him in the kitchen, warming himself at the stove. They were taken aback. No doubt they had expected to find the great man laboring over a dis-

secting-table, or silently contemplating the stars. Surely not sitting in the kitchen, where servants and other common people gather to chat and tell stories. This could not be a place for philosophy. They waited at the door. But Heraclitus turned to them, and said, "Come in. Don't be upset. There are gods here, too."

⁵⁴ Cf. *PA* I.5, 645^b15–24.

APPENDIX: THE FUNCTION OF MAN

Any analysis of Aristotle's functional arguments—and especially an analysis linked, as this is, with an exposition of Aristotle's views on practical reasoning and the explanation of human action (cf. Essay 4) must give some account of one of the most perplexing and problematic of those arguments, the famous argument concerning "the function of man" in *Nicomachean Ethics* I.7.¹ This argument presents difficulties both for a general understanding of Aristotle's teleology and for the proper assessment of the methods and aims of his ethical project. Essay 4 will treat the difficult ethical questions it raises more systematically and in greater detail; here I shall be able only to sketch the problems posed by the argument itself, to propose a plausible interpretation of its content and its results, and to indicate briefly what it implies for our understanding of Aristotle's aims in ethics.

We have seen that Aristotelian function-ascribing arguments usually concern themselves with the analysis of a complex containing-system—an animal, plant, or machine—into simpler systems and components. The point of ascribing a function to *x* is to show what vital activity of the whole organism is realized in that organ or system. Functions are, in the biological works, never ascribed to creatures as wholes, since this would serve no analytical purpose. But in the *Nicomachean Ethics*, we are suddenly confronted with a strange passage:

A clearer account . . . might perhaps be given, if we could first ascertain the function of man. For just as for a flute-player, a sculptor, or any artist, and, in general, for all things that have a function or activity, the good and the 'well' is

¹ Clark's *Aristotle's Man* contains an interesting and helpful discussion of this argument (chapter II.1) with which I am largely in agreement. Cooper's *Reason* draws a perceptive contrast between this argument and its counterpart in the *EE* (145, n. 2, and 148, n. 5).

thought to reside in the function, so would it seem to be for man, if he has a function. Have the carpenter, then, and the tanner certain functions or activities, and has man none? Is he born without a function? Or as eye, hand, foot, and in general each of the parts evidently has a function, may one lay it down that man similarly has a function apart from all these? What then can this be? Life seems to be common even to plants, but we are seeking what is peculiar to man (*to idion*). Let us exclude, therefore, the life of nutrition and growth. Next there would be a life of perception, but *it* also seems to be common even to the horse, the ox, and every animal. There remains, then, an active life of the element that has a rational principle (1097^b25 ff., tr. Ross).

The physiological organ, the eye, realizes some constitutive activity in the life of an animal. When we know the function of the eye, we know what point there is in animals' having eyes. In similar fashion, the question, "What is the function of a tanner?" helps us to understand why we have tanners in the *polis*: the workings of a larger containing system are being analyzed by ascribing constitutive functions to its parts. Our first reaction is to look for the containing system in which human beings are being characterized as rational agents, to ask in what whole their practical reasoning is a constitutive activity. If the argument does not, as Hardie believes, imply that man is an artifact, "an instrument designed for some use,"² it does at least seem to ask us to look at the entire universe, and to see how human purposes fit in with the life and activity of the whole. As we have argued earlier, such an approach would be a violation of Aristotle's constraints on teleology, and an exception in the *corpus*.

There is, however, no trace of such a plan in the argument itself or in the conclusions drawn from it. The argument devotes itself to an analysis of the capacities of human beings, asking which are and are not shared with other living creatures; its

² Hardie, *AET*, 23.

conclusion is only that a distinctively human life involves the exercise of practical reason. Neither in this book nor even in Book X is there any suggestion of divine providence or universal purpose. Even when we are invited to strive for divinity and to identify ourselves with the divine in ourselves, it is never with the end of *serving* the gods or a divine plan; nor does Aristotle anywhere indicate that the question, "Why are there human beings?" would be of the slightest interest to him.

The argument shares with the function-ascribing arguments to which it refers not their goal of analysis, but only their interest in the distinctive or characteristic. All ask what this thing does that nothing else like it does, what the differentia is which separates it from other members of its genus, what activity it causes not *qua* genus-member, but *qua* itself (cf. *Ph.* II.3).³ The examples that Aristotle cites, and the terminology of function, are indeed rather misleading if we look for a close analogy; this much cannot be denied. But it is also quite clear from context that Aristotle was interested only in a more limited analogy and was not, in fact, announcing a change in his general policy.

But to say this only gets us to the beginning of the really difficult questions raised by the argument. For we need to know (1) why Aristotle is interested in providing an account of human nature at the outset of a moral inquiry; (2) why, within such an analysis, he places such singular stress on the non-shared activity; and (3) why, among the non-shared activities (of which even Aristotle notes several),⁴ the activity of practical reason is given the first place. The first question is, for our purposes, the most crucial. Aristotle appears here to be saying that if we know what a man is, we will know how he should behave; he seems to be deriving behavioral norms from factual observations concerning human nature. He has, furthermore, been thought to

³ Clark concludes (26) that "*ergon* and *eidos* are here identical." Aristotle is indeed arguing, as I shall claim, that a good human life includes the proper exercise of all the capacities belonging to the *eidos*, but the term *ergon* seems clearly to be used for the part of the *eidos* that is *idion* (1097^b34), unshared—the differentia.

⁴ Cf. Clark, p. 17; there are other examples in the biological works.

be treating these observations as given a priori, as forming the unquestionable, immutable basis for an ethical science.⁵ Before we can give a proper analysis of Aristotelian deliberation, we must try to understand (a) what Aristotle believes to be the function of reflection concerning human nature in one's deliberation about the good life, and (b) what status he accords these reflections in his scientific inquiry.

Why should it matter to me in my deliberation about what goods to pursue that men are creatures with capacities X, Y, and Z, of which only Z is not shared by the other related species? I am an individual; what do the goals of others matter, what does even my species-membership matter, in deciding what is good for me? Aristotle's answer, as it emerges here and elsewhere in the *Ethics*, is not some crude form of the naturalistic fallacy, but a subtle and powerful observation about human deliberation. Though it can be only briefly and apodictically set out here, with less textual support than I should like, I believe that the argument is something like this. We are not, when we deliberate about our good, solitary beings concerned only with our own satisfaction and our own responses. We are social creatures who require the company and the approval of others for a fulfilling life. We therefore deliberate with a view to justification: a good life must be one that we can justify as good to our fellow human creatures. The possibility of winning approval and reaching agreement is fundamental to our life and projects, since self-respect in a community of men is, for us, a basic good. We therefore must ask ourselves not simply, "What's a good life for me?" but "What's a good *human* life"—i.e., what life can I hope to commend as good to my fellow citizens? Deliberation takes place not in a vacuum, but in the *polis*. Prior to deliberating, I identify myself as a member of a

⁵ Cf. for example Maritain's interpretation in *The Rights of Man*: we are all like pianos, to be tuned to an external and independent (immutable) standard, the standard of human nature established for all time by God. It is not up to us to decide or to agree about what we are; that is given. Either we put ourselves in tune, or we must be "discarded as worthless" (61; for further discussion of Maritain's Aristotelianism, cf. Essay 4).

certain group, the human species; my reflections about action presuppose some notion of what a human being is, to what kind of community I belong, with what kinds of creatures I am trying to reach agreement. Aristotle indicates more than once that deliberation starts from a conception of the human person, and that this notion of what one is underlies the entire enterprise. "Each man wishes what is good for himself; but nobody chooses to have everything as becoming another sort of thing (as, e.g., a god now possesses the good); he chooses as what he is" (EN 1166^a19 ff.). Nor can one wish one's friend the good of becoming another sort of being; deliberation and well-wishing, to make sense, must remain within the confines of a hylomorphic theory of personal identity. "A friend wishes his friend good for the friend's own sake—so he will have to remain the sort of creature he is; then he wishes him the greatest good he can have as a man" (EN 1159^a5 ff.). Aristotle realized as keenly as did Plato the importance to ethical deliberation of a theory of personal identity; and his hylomorphic theory denied, as Plato's dualism did not, that the person could ever exactly *be* the divinity within him.

We want, then, to reach some agreement about what a human being is before we try to see whether we can agree on the best plan of life—a life which we can justify to one's peers. There is in the argument as I have presented it no appeal to self-evidence, no hint that the capacities we are discussing are our god-given essence that we are exhorted, in consequence, to use to the full. Aristotle presents this argument as a "sketch" (*perigegraphthō*, 1098^a20), which can be filled in in the course of time and within the limits of precision set by the nature of the subject matter. Shortly thereafter (1098^b10 ff.), he insists on the importance of considering *ta legomena*, what we say; a correct account will be one that harmonizes with this evidence, while a bad one will soon clash. The *Ethics* explicitly builds its account upon the *phainomena*, or *legomena*, of action.⁶ The criticism of the Socratic account of *akrasia* in Book VII (cf. especially

⁶ Cf. Owen, "Tithenai."

1145^b20, 27) is the occasion for one of Aristotle's most famous and most explicit methodological claims (1145^b2 ff.): we must in ethics, as in other areas, set down the "appearances," work through the problems they present, and produce an account which will preserve all of these common beliefs, if possible, but, if not, the greatest number and the most important. Moral philosophy starts from our common beliefs and sayings, from which it tries to build a harmonious picture.

The discussion of human nature gives no evidence of violating this general aim. Its context and its content indicate that it is an attempt to make some clear sense of our ordinary beliefs about what a human being is before we try to reach agreement about a good life for a human being. Aristotle addresses the work to reflective men (1095^a6 ff.), men who want to plan their lives and not merely to live from moment to moment. He suggests that for such men a sorting-out of the questions with which the *Ethics* will deal *will* make a difference—not because it will put them in touch with the *a priori*, but because, as archers, they will thereby get a clearer view of the target at which they are aiming (1094^a33–34). What we ought to be after in ethics, he suggests, is a broad consensus among the mature and reflective, an ordering of their moral intuitions through reasoned adjustment of competing considerations—a theory very much like Rawls's notion of "wide reflective equilibrium,"⁷ which explicitly rejects appeals to the *a priori*, but also insists that a non-relativistic agreement can be reached among rational men.

This does not yet, however, tell us exactly *how* an analysis of human nature ought to affect rational deliberation—and, particularly, why Aristotle should be so very interested in man's *characteristic* activity, or *ergon*. Limits of space prevent a fully adequate account of these questions. But a plausible reading of

⁷ Rawls, *A Theory of Justice*, especially 20–21 and 48–53. The approach is shared by Sidgwick, who, like Rawls (51, n. 26), traces it back to Aristotle. Cf. especially *Methods of Ethics*, Preface to the 6th Ed.: "What he gave us there was the Common Sense Morality of Greece, reduced to consistency by careful comparison: given not as something external to him but as what 'we'—he and others—think, ascertained by reflection."

the emphasis on reason can, I think, be found. Throughout this section of Book I, Aristotle's main concern has been with popular hedonism. "Most men appear to prefer a slavish life, a life fit for beasts" (1095^b19). Aristotle is not going to go on to propose a view of the good life that *minimizes* the exercise of those capacities that we share with other animals.⁸ In the account of the virtues the ascetic is as defective as the excessively sensual. The *ergon* argument cannot be telling us that we should concern ourselves with reason *only*. Nor does it appear to say this. But the emphasis on this characteristic activity can be seen as motivated (1) by the challenge of hedonism and (2) by practical reason's *architectonic* function: it, and it alone, can arrange for both reason and the shared animal functions to get their due place in a complex human life. Aristotle commends to his reflective audience a life that (1) involves the exercise of all our human capacities, and is thus a truly human life, rather than one which could just as well be led by a plant or a cow, and that (2) is governed and planned in such a way as to give both shared and non-shared capacities their appropriate role—and this means governed and planned by practical reason. If we think reflectively about what a human being is, he suggests, we will have reason to prefer a life under the direction of practical reason to the slavish or cowlike life of pleasure and also to *any* life that is carried on without order or direction. We want a life that uses all our capacities. Such a life both includes the exercise of reason and requires rational direction.

⁸ This is clearly true of *EN* I–IX; Book X raises perplexing problems. Cooper's *Reason* (II–III) offers an excellent discussion of the difficulties and a convincing defence of the "inclusive-end" reading of the *EN*.

ESSAY 2

THE *DE MOTU ANIMALIUM* AND
ARISTOTLE'S SCIENTIFIC METHOD

At the opening of the *Meteorologica*, Aristotle pauses to comment on the general outlines of his whole series of inquiries concerning natural change and living beings:

We have spoken before about the first reasons in nature, and about natural change in general, and also about the stars that are marshalled in accordance with the motion of the heavens, and about the bodily elements: their number, their kinds, and their changes from one to another, and about coming-to-be and perishing in general. The part of this inquiry which remains to be pursued is what everyone used to call "meterology" (338^a20–29).

After a few comments on the subject-matter of the inquiry at hand, he continues:

When we have gone through these subjects, let us see if we can give an account, according to the procedure we have been following, of animals and plants, both in general and separately. For when we have said this, we will have just about completed the whole plan we set out from the beginning (339^a5–9).

This probably served as an introduction to a course of lectures given by Aristotle on natural science.¹ There is good reason—stylistically and contextually—to think it was composed by Aristotle himself,² and that it shows, if not that the treatises were mapped out and composed in the order indicated (which they almost certainly were not), then at least that Aristotle

¹ Mansion, *Introduction*, 7–31; cf. also Düring, *PA*, 5 ff.

² The question of authenticity receives a thorough discussion in Capelle, "Das Proömium."

viewed them as interrelated parts of a single course of instruction, with a certain logical order that ought to be followed in presentation and study. Aristotle claims he is following a constant general procedure in all these inquiries and indicates that, far from representing an abrupt change of interest and of scientific priorities, the biological works are the necessary completion of the course of inquiry that began with the *Physics*; the study of natural change cannot be brought to a satisfactory close without them.

The *Meteorologica* passage refers to the *Physics*, *De Caelo*, *De Generatione et Corruptione*, and, without enumeration, to the biological works. It looks as though the plan is to begin with a general discussion of change and motion, and then to pursue this into specific areas of natural study, speaking of the heavens, the elements, weather, and, finally, of the many species of plants and animals.

The *De Motu Animalium*, traditionally a part of the biological corpus or of the related *Parva Naturalia*, does not fit obviously into this plan. Instead of the treatise devoted exclusively to general problems concerning animal motion which we might expect as sequel to the *De Incessu*, we find a work large sections of which are devoted to cosmological problems, and that re-examines and criticizes important arguments of the *Physics* and *De Caelo* in connection with its comparison and contrast between heavenly and animal motions.³ In the methodological remarks at the opening of the treatise and in many of the specific discussions throughout, we find a blend of biological and cosmological speculation that might strike us as anomalous in the light

of such passages as the one cited from the *Meteorologica*, which suggests that the two are separate departments of inquiry, occupying different places in a course on natural change. Again, at the opening of the *De Caelo*, Aristotle divides the study of nature into three branches: the study of first principles (the *Physics*), the study of bodies and magnitudes (*DC* and *GC*), and the study of things having body and magnitude—e.g., of plants and animals (268^a1–6, and cf. Simplicius *In DC* 7, 1–2). In *PA* I.5 (644^b22 ff.) Aristotle distinguishes the objects of cosmology (eternal natural beings) from those of biology (beings subject to coming-to-be and perishing); cosmology is more difficult, but even the little information gained is, because of its higher value, more pleasing than a detailed view of many other things. Biology is felt by Aristotle to require defence against those who consider it a base and disgusting form of study (645^a7 ff.). Such remarks, though they do not preclude a study blending biology and cosmology, strongly suggest that Aristotle, when he wrote them, did not envisage such a study as a necessary conclusion to his course of inquiry.

But the problem is deeper yet, and the *MA* project more anomalous than these remarks have suggested. It will not do simply to conclude that Aristotle added to his works on natural science an appendix that he had not, at some earlier point, envisaged. For the interdisciplinary study contravenes a basic tenet of his philosophy of science. Both the *Prior Analytics* and the *Posterior Analytics* argue that each science must start from true and necessary first principles peculiar to that science and proceed deductively towards its conclusions. Any argument that is not based, ultimately, on some undemonstrated first principles peculiar to the genus in question will not convey scientific understanding; it will be incorrect or vacuous.⁴ As each science starts from its own appearances and proceeds inductively towards first principles, so the deductive reconstruction of the science will begin with principles that belong to that, and to no other, branch

³ It is interesting, in this connection, to contrast Albertus Magnus's *De Motibus Animalium*, his conjectural reconstruction of what was then for him a lost section of the *PN*, with his actual commentary, *De Principiis Motus Progressivi*, written after his discovery of a manuscript of the *MA*. The earlier treatise makes reasonable guesses about the contents of an Aristotelian treatise on animal motion, beginning with a criticism of Aristotle's predecessors and then presenting "Aristotle's" views on the roles of soul and body in motion. But it ignores the movement of the heavens, to which much of the subsequent commentary must be devoted.

⁴ Especially *APr* I.30, 46^a17 ff.; *APo* I.27, and 76^a26–30, 74^b25, 84^b14–18, 88^a31; *DC* 306^a6 ff.; *GA* 748^a7 ff.

of inquiry.⁵ A valid deduction may not pass from one genus to another,⁶ and may use material from another science only as a source of illustrations and models—as mechanics uses geometry, optics arithmetic—not to provide a necessary step in the argument.⁷ Even the axioms that are used by all sciences are not, in reality, first principles common to them all. They are common only “by analogy”; i.e., what appears to be a single principle is, in fact, a plurality of analogous principles, each belonging to one of the special sciences.⁸

Now it is not always perfectly clear how Aristotle means us to understand this talk of genera. At times he seems to understand these as very broad divisions corresponding to the major types of substances and to the associated major generic branches of scientific inquiry. Thus at *DC* 306^a6 ff. we hear that first principles must be in the same genus as the *phainomena* they are to explain: perishable for perishables, perceptible for perceptibles, eternal for eternal. This would not by any means show that biology could not draw on element-theory, or geometry on arithmetic. A number of Aristotle's references to *genē* and to proper (*oikeiai* or *idiai*) first principles give us no information at all about what is intended; several are inconclusive, since Aristotle's illustrative examples, while each is a more specialized science within a broad genus, are also members of different broader genera: geometry is contrasted with mechanics, arithmetic with optics, points with monads (*APo* 76^a22 ff., 88^a31, 88^b25 ff.). (One passage seems to assume the *genē* in question are the categories (88^b1–3); another criticizes for being outside the proper genus principles that appear to belong—though they are in fact false—to the science in question, narrowly conceived.⁹) But often enough Aristotle does indicate that deduc-

tions must proceed from principles belonging to the special science in question, as narrowly conceived, and use nothing outside that science to reach conclusions. *APr* 46^a17 says clearly that astronomy, for example, must use astronomical premises; *APo* 75^a37 cites as exemplary of the forbidden “transition to another genus” a move from geometry to arithmetic; Bryson's misguided attempt to square the circle started from assumptions that are mathematical, but not strictly geometrical (*APo* 75^b40; cf. *SE* 171^b12–18, 172^a2–7); 76^a37–^b2 cites as examples of *idiai archai* premises that are strictly geometrical, whereas the general proposition that equals subtracted from equals leave equals is a forbidden common principle. Of course the *MA*, if it makes use of biological material to prove cosmological conclusions, and/or the reverse, will be guilty of violating not only the stringent injunction against specific *metabasis*, but also the weaker one against transition from the eternal to the perishable; it will thus be guilty not only of the sophistries of Bryson, but of the absurdities of Empedocles (*DC* 306^a6 ff.).

A precise account of what these strictures forbid depends on a decision about how to read the *Posterior Analytics* as a whole. If it is a set of methods for scientists to use in actual research, the scientist will be barred from using biology to come to know anything about the stars. On the other hand, the strictures may apply not to the process of discovery, but only to the finished and formal presentation of the conclusions of research. No matter how we find it out, if we can at the end of our work deduce the conclusion from the appropriate first principles, it will be acceptable. This is not the place to enter into a full-scale discussion of how to read the *Analytics*. The most plausible account seems to be that the treatise provides a model not for research, but for justification of the scientist's claim to have acquired genuine knowledge. He may proceed without the syllogism in his initial *zētēsis* (and most of Aristotle's scientific work represents this stage of the scientist's activity); but if he wishes to convince us of the epistemological status of his results, justifying his claim to real *epistēmē*, he must be able to cast his results in deductive form, basing them on the right kind of first

⁵ *APr* 46^a17 ff.

⁶ *APo* 84^b14–18, 75^a37 ff.

⁷ *APo* 76^a22. Cf. Owen, “Platonism,” 139–42.

⁸ Cf., for example, 76^a37–^b2, 77^a22–25, 88^b25–29.

⁹ *GA* 748^a7 ff.; the principles in question are certainly biological; the most obvious problem is that they are simply not true.

principles.¹⁰ Thus he might conceivably use biology to get his cosmological conclusions in the first place; what he could not do is to invoke biological data and principles in the course of a justification of cosmology.

The *MA* will prove to violate even this weak reading of the *Organon's* demands: it will not only use one science to get knowledge about another, but also claim that the second provides a necessary part of any valid justification of the principles of the first. If it violates the justification stricture, it appears to be incompatible as well with other readings of the *Posterior Analytics*, in which the prohibitions against *metabasis* do even more work. There will be one case, discussed at length in Essay 3, in which the interdisciplinary work may be merely heuristic and dispensable once we reach the goal; this may, then, not count, as the arguments discussed in this essay clearly will, as a violation of the deductive model. In fact, however, Aristotle probably sees the prohibition against justificatory *metabasis* as bound up with, or even as posterior to, a prohibition against the zetetic use of cross-disciplinary material. His argument for the claim that each deductive system proceeds from its own proper premises was that each science starts its search for principles from a single and sharply delineated range of *phainomena*; for each area of experience there is a science, and since each set of *phainomena* is separate from each other set, the principles that explain each at the most basic level must, in similar fashion, be separate (cf. *APr* 46^a17 ff.). This is hardly an argument; and against the idea of a meta-science, from which the first principles of all would be deduced, Aristotle proceeds with bare assertions. Induction from specialized data (even supposing it *has* been

¹⁰ I am thus not very far from Barnes's position ("Aristotle's Theory") that the syllogism is a tool for teaching, rather than for research. Both of us would insist that *zētēsis* need not use the syllogism and that the fact that it is not in evidence in zetetic writings does not indicate that Aristotle has modified his view about its function or importance. I would, however, accord the syllogism a more important place in Aristotle's scientific epistemology than Barnes seems to when he treats it as a didactic device and would insist that it functions in all justification contexts, not only in the classroom.

shown that the *phainomena* that the several sciences take as territory do not overlap) takes us only as far as special first principles because there are none higher that would connect the separate areas. But there are and can be none higher only because they would have to be common principles, peculiar to no single genus (76^a16 ff., 88^a31 ff.). This sort of science by fiat is the *Posterior Analytics* at its weakest and most rigid. At any rate, these assertions disclose a bias against zetetic use of alien matter (or, perhaps better, a belief that such zetetic use cannot usefully be made) that would make the *MA's* arguments concerning the connate *pneuma* as anomalous as the cosmological arguments that we shall discuss below.

One possible solution to the questions the *MA* raises for an assessment of Aristotle's scientific method is to conclude, as did Rose,¹¹ that the *MA* is such a strange, interdisciplinary work and accords so poorly with what we know Aristotle believed that it cannot be genuine. The prevalence of the view that Aristotle throughout his career insisted on neat divisions of subject matter and saw the sciences as formally separate deductive systems has certainly contributed to the neglect of the odd *MA* by commentators and editors of various periods.

But there is another and more attractive solution to be considered. Perhaps the *MA* does indeed represent a departure from the *Organon's* system, but a deliberate and a fruitful one. On other grounds possibly one of his latest works (cf. Part I, chapter 1), it is a fine example of his capacity for self-criticism, both in its treatment of specific problems and in its more general outlines. Aristotle acknowledges in this treatise that some vital conclusions in the single sciences cannot be secured independently of our findings in other areas, and moves, in consequence, towards a less departmental and more flexible picture of scientific study. He recognizes, first, that the inquiries of the biological corpus that were aimed at producing an account of the reasons for the activities of particular types of animals are incomplete without a more general essay showing the reasons and conditions

¹¹ Rose, *De Arist. libr. ordine*, 163–64.

for any animal motion. This inquiry will rely on cosmology to show us what must be the case in the universe as a whole if this motion is to take place and to assure us that these conditions do, in fact, obtain. Second, Aristotle acknowledges that some of his tentative arguments for important physical and cosmological conclusions are unconvincing without a discussion of the problems posed by animal self-motion. Here biology proves essential to cosmological demonstration. In the course of the treatise, Aristotle is able to criticize some of his previous conclusions about other cosmological problems; biology provides a useful corrective to some misleading mathematical abstractions in the *DC*. Brief and cryptic though it is, the *MA* makes a valuable contribution to our knowledge of Aristotle's mature views concerning the articulation of the universe and of man's sciences.

THE *MA* AND *PHYSICS* VIII

The treatise begins with a backward reference to the other biological works;

The movement of the animals that belong to each genus, and how these are differentiated, and what the reasons are for the accidental characteristics of each—all this we have considered elsewhere. But now we must consider in general the common reason for moving with any movement whatever (for some animals move by flying, some by swimming, some by stepping, some in other comparable ways) (698^a1–7).

Previous inquiries into the various modes of local motion¹² must now be supplemented by a general account that will give the common *aitia* for any animal motion whatever. This is really, as we shall see, a demand for as many explanations as are relevant or illuminating; and all four *aitiai* of *Physics* II figure somehow in the *MA* account. For our present purpose, we may focus on two of these: the material and the teleological. In its

¹² On the back-references and the relationship of the *MA* to the other biological treatises, see the notes to chapter 1, 698^a3, 4.

first four chapters, the treatise asks about the "material cause" of animal motion—implicitly associated here, as elsewhere, with the notion of the hypothetical necessity.¹³ What conditions must obtain (a) in the animal's own body and (b) in the universe around him, if motion is to take place? Now if animals were able to initiate motion in themselves from a state of rest, regardless of external conditions, this material account of animal motion might invoke only the principles of biology itself, without relying on more general physical principles or on the findings of cosmology. But it turns out that a satisfactory account cannot stop here. Animals are not in the unqualified sense self-moving; the best statement of the conditions for animal motion must include an account of the animal's physical environment, telling us what that environment has to be like if motion is to take place as it does. To show that these conditions do, in fact, obtain is the work of cosmology.

Second, the demand for a general *aitia* is a demand for a teleological account of animal motion: for what do animals move, and to what goals or ends? It asks for an account of the desiring faculty and its objects. This account is provided in the second half of the treatise, where Aristotle will suggest yet a further reason why biology must (at least zetetically) depend on cosmology: a satisfactory account of the physiological realization of desire cannot be reached without making use of the theory of heavenly motion.¹⁴ Thus the introductory promise of a common *aitia* of animal motion is also, in two ways, an acknowledgment that the departmental study of biology can be adequately brought to a close only by invoking the findings of other sciences. We shall see, in our more detailed examination of the *MA*'s arguments, how this is the case.

So far, we are concerned with a biological inquiry that may or may not need completion from other sources. We have every reason to expect that the treatise will, like others in the biological sequence, concern itself primarily with animals and their sublunary environment. But the second introductory statement

¹³ Cf. Essay 1.

¹⁴ These arguments will be discussed in Essay 3.

indicates that it will deal with cosmological problems as well and offers a reason for this concern:

Now that the origin of other movements is that which moves itself, and that the origin of this is the unmoved, and that the first mover must necessarily be unmoved, was determined before, in the course of our discussion of eternal motion: whether or not there is such a thing, and, if there is, what it is. We must however, grasp this not only generally and in theory, but also in the particular cases and in objects of sense-perception: it is through these that we go on to look, as well, for general explanations, which we believe must be in harmony with them (698^a7–14).

Now it looks as though the dependence of biology and cosmology is mutual: the general inquiry into the conditions for motion in the universe that Aristotle conducted in *Physics* VIII¹⁵ now needs to be tested to see whether it will fit with specific findings about animals; and biology is said to be necessary for the satisfactory conclusion of the arguments for the unmoved mover.

The *Physics*, like the biological works, begins with the *phainomena*;¹⁶ but the data upon which it builds its general account seldom mention the motions of particular kinds of beings. *Physics* I suggests that this inquiry is, if universal (*katholou*), universal only in the way a vague sketch is universal; it must eventually be grounded more securely in an understanding of particular cases.¹⁷ A child calls all men fathers and all women mothers before it is able to distinguish its own parents (184^b12–14). Once it gains experience of particular cases, its generalizations ("male," "female") are *katholou* in a new and truer sense. So, too, the *Physics*, Aristotle suggests, may prove incomplete

¹⁵ The reference is not specified in the text, but although *Metaphysics* XII contains much parallel material, its references to the subject of self-motion and the eternity of motion are always cursory, as though they either projected a future inquiry or summarized the results of one already undertaken.

¹⁶ Cf. Owen, "Tithenai."

¹⁷ 184^a23–24; cf. Ross *ad loc.* on the use of *katholou*.

and vague without the more departmental treatises announced in the proem to the *Meteorologica*. It is in the discussion of eternal motion in Book VIII that this defectiveness becomes most obvious.

Book VIII has a more *a priori* character than the rest of the *Physics*. If views other than Aristotle's are discussed, they are, for the most part, not common beliefs, but the theories of other experts. Although this seems inherent in the nature of the subject, Aristotle has good reason to feel uneasy about his failure to ground such crucial arguments more firmly. The most pressing source of his unease is clearly the problem of animal motion, which threatens his arguments both for the eternity of motion and for the first mover. For if animals can initiate movement in themselves from a state of rest, without external agency, movement in the universe need not be eternal. And if there can be genuine self-motion that does not require an unmoved mover, the arguments in chapters 5–6 establishing the unmoved mover will not go through. Animal local motion is obviously a touchy problem in all these arguments. At 253^a7–8, Aristotle acknowledges that it "would seem to be a particular source of perplexity"—and, accordingly, his arguments have a tentative look.

To the claim that animals can move themselves from rest, regardless of external conditions, Aristotle answers that this cannot be strictly true:

We always see one of the natural parts of the animal in motion; and the reason for this is not the animal itself, but perhaps (*isōs*) the environment. We say that it moves itself not with every sort of motion, but only local motion. So nothing prevents—perhaps, rather, it is necessary—that many motions come about in the body under the influence of the environment, and that some of these move reason or desire, and these the whole animal—as happens in sleep; for when there is no perceptual motion going on, but there is *some* sort of motion, the animal wakes up again (253^a11–21).

This appeal to our ways of talking about animal motion is vague and tentative. It leaves the most important problem, that of

local motion, unresolved. *Many* motions are caused, not by the animal itself, but by the environment; but the example of sleep and waking is not an example of what we would ordinarily call self-motion in any case. Perhaps the reason for local motion, too, lies in the environment; but this passage does not say that, nor does it assert that our ordinary descriptions of local motion as self-motion are wrong.¹⁸

Chapter 4 insists that animals are not self-moving as a whole; we must find in them, as in artifacts, a division into moving and moved parts:

What is unclear is not whether it is moved by something, but how we should divide the mover and the moved. For it looks as though in animals, just as in boats and things which are not formed by nature, the mover and the moved are distinct, and that in this way the whole creature is self-moving (254^b28–33).

This, of course, does not show that self-motion depends on anything *outside* the animal; and even these modest claims are put forward hesitantly, as if pointing to a field of study so far undeveloped. It is "unclear" how the division should be made; and even the fact of the division is asserted with "it looks as though" (*eoiken*). The passage indicates a need for a more elaborate study of the internal divisions in animal motion—a study which is carried out in the chapters 1, 8, and 9.

In chapter 6, Aristotle returns to the problem of chapter 2:

We see that there plainly are things that move themselves, e.g., the class of living things and animals. These suggested that motion might possibly come into being at some time, not having existed at all before, since we saw this happening in them (for being immobile at some time, they are then set

¹⁸ In this and the ensuing discussions I am greatly indebted to Furley's stimulating paper, "Self Movers," Symposium Aristotelicum 7 (1975). Furley suggests a slightly different reading of this passage, which does not distinguish between local motion and other sorts of change, and argues that Aristotle is tentatively trying a stimulus-response account of all changes.

in motion, as it seems). Well, we must understand this: that they move themselves with one motion only, and that not strictly (*ou kuriōs*); for the reason (*aition*) is not from themselves. But there are other natural motions in animals that they do not have through themselves, e.g., growth, decay, respiration, which each animal undergoes when it is at rest, and not in motion with its own motion. The reason for this is the environment, and many of the things that enter (the animal), such as food, in the case of some: for while it is being digested they sleep, and when it is being distributed they wake up and move themselves, the first origin being outside. Hence they are not moved continuously by themselves (259^b1–15).

This passage deserves close scrutiny. Some critics have read it as a general denial of self-motion to animals, and a claim that even local motion is caused by input from the environment. Thus Hardie and Gaye even translate and punctuate lines 7–8: "The cause of this is not derived from the animal itself: it is connected with other natural motions in animals. . . ." ¹⁹ In fact, Aristotle seems to be making two separate points: (1) Local motion is the only genuine self-motion; but even this is not *strictly* self-motion, since it depends on an external *aition*. (2) In the case of the *other* natural motions (growth, decay, respiration, etc.), there is no reason to think any is genuine self-motion. They can be adequately explained by citing the responses of the bodily mechanism to environmental stimuli. (2) is the same point already made in chapter 2; it will be repeated and developed in *MA* chapter 11, where the same examples are used to discuss the "non-voluntary" motions. (1) is obscure and undeveloped. What is the external *aition*? And in what sense, given that there is this external *aition*, can animals be said to be self-moving? The *Physics* provides no further answers. Its arguments have gaps that can be filled only by an adequate account of animal

¹⁹ Ox. Trans. *ad loc.* Furley (with the OCT) punctuates: "for the cause is not in themselves, but there are other motions . . ."; he understands the claim as Hardie and Gaye apparently do, suggesting that Aristotle is proposing here to explain all motions in animals with the external stimulus account.

motion and its relationship to external goals and external necessities. The *MA* undertakes to provide such an account, grounded in the specific data of the preceding biological works.

One more factor complicates the picture. The heavenly spheres are living beings, too.²⁰ Thus the study of animal motion may serve in one more way to illuminate the structure of these remote and little-known motions. We can assume that, in certain respects at least, there is an analogy between animal-motion and sphere-motion. If we find that for animals to move, Y is required, we can often posit (if it is consistent with other principles of cosmology) some factor analogous to or isofunctional with Y in the motions of the heavens.²¹ The *MA* contains a mixture of direct argument and argument from analogy. It tackles the problems of *Physics* VIII directly by attempting to show that animals are not self-movers in a sense that causes problems for the central arguments there. And it argues by analogy, working out the implications of the general analysis of animal motion for our understanding of the other prominent group of *empsucha*, the heavenly spheres. The first approach predominates in chapters 1 and 2, where Aristotle shows that for the animal to move there must be something unmoved within him, and also an external resisting surface; the second approach predominates in chapters 3 and 4, where similar assumptions about the motions of the heavens are made the basis for rejecting several alternative theories. The section of the treatise on the final cause, which begins in chapter 6, combines the two procedures: the animal is not self-moving because (in addition to the reasons offered in chapters 1 and 2) its motions must be explained with reference to an external object of desire, which is an "unmoved mover." The heavenly spheres, similarly, are

²⁰ Cf. *infra* on chapter 3 for the evidence for this view.

²¹ One problem with the analogy between animals and the heavens is that in the case of animals the material necessity can, and must, be clearly distinguished from the final cause of motion. In the case of the heavens, the hypothetical necessity is bodiless substance, which is also the mover as goal. Aristotle's arguments in the *MA* are separated according to the distinction between necessity and the final cause for animals; but at some points it is not very clear which of the two is in question in the case of the heavens.

moved by an object of desire: this object is the unmoved mover, argued for on other grounds in chapters 3–4. The arguments might be outlined as follows:

I. THE MATERIAL EXPLANATION

A. Direct

1. The internal structure of the animal: chapter 1 (and 8–9)
2. The relationship between the animal and its environment: chapter 2 (and *GC* II.10)

B. Analogical

- 1'. The internal structure of the spheres (dis-analogy): chapter 3 and *De Caelo* (cf. *infra*)
- 2'. The relationship between the heavenly spheres and their environment: chapters 3–4

II. THE TELEOLOGICAL EXPLANATION

A. Animal motion: animals and their external objects of desire: chapters 6–10

B. Heavenly motion: the spheres and the unmoved mover: chapter 6 (and *Metaph.* XII)

ANIMAL MOTION AND HEAVENLY MOTION IN THE *MA*

Chapters 1 and 2: introductory remarks on animals

Aristotle's first question is: if any creature is going to move, what must be the relation of its parts to each other and of the whole to the environment? The first half of this inquiry takes up the problem raised in *Ph.* VIII.5, where it was said that it looked as if animals, like artifacts, have to have both mover and moved within them, but that it was unclear how the division into mover and moved should be made. *Ph.* VI.10 had observed in general that nothing indivisible could be moved, and *IA*, chapter 3, claims that a moving creature requires at least two parts, one being active, one passive, as well as a resisting surface outside.²²

²² See notes *ad loc.* for further detail on these passages.

The *MA* gives a general theoretical account of this condition, with a quasi-mathematical analysis of the working of joints. The joint in a limb can be understood to be like the center of a circle, around which a hypothetical radius is rotated; but Aristotle emphasizes that we must not fail to distinguish between the hypothetical center, which is a point, and the joint, which is a magnitude, and divisible into the moving and the resting part (698^a24–b1). Whenever the lower part is moved, the relative *archē* of motion²³ (i.e., the part of the joint in the upper of the two segments) is at rest (698^b1–2). Chapter 1 concludes by observing that the creature, if it is to move either as a whole or part by part (698^b6–7) must have some distinction of parts within it, and one of these parts must remain at rest relative to the one that moves “pushing off against it” (698^b6).

The arguments of chapter 1 do answer some of the worries about animal motion raised in *Physics* VIII. The animal is not a self-mover in the sense that it moves itself all at once, as an unarticulated whole; for some parts to be active, others must be (at least relatively) fixed (cf. VIII.4). As chapters 8–9 will argue, an examination of animal joint-physiology establishes that coordinated motion of this kind presupposes a single central *archē*. But the analysis presented here does very little for the important problems of the *Physics*. For all we know, the active parts might be able to initiate motion in the animal from a state of rest, relying only on the animal's own passive parts, and on neither stimuli nor stable resistance from the environment. VIII.4 compared the animal to an artifact: as in “boats and things not formed by nature, the mover and moved are distinct.” But the artifact is moved by something external, the animal (so far as we now know) by its own physiology.

Chapter 1, then, does not advance the direct argument for the unmoved mover; nor does it help to establish an analogy between heavenly and animal motions. Aristotle will emphasize later that the heavenly sphere is continuous, and is not to be con-

ceived of as having parts, or a distinction between mover and moved (chapter 3). What is entirely *suneches* and *sumphues* cannot be self-moving from place to place.²⁴ The stars are not provided with organs for local motion—their shape is the most useful for motion in the same place, the least suitable for progression. We infer this from its being the farthest from animal shapes, with their separate and projecting parts.²⁵ The heavens are not self-moving from place to place, but in the same place, and so do not require the internal division into mover and moved.

Chapter 2 makes more progress with both the direct and the analogical arguments. Here Aristotle argues that, regardless of the division into mover and moved *within* the animal, motion cannot go on unless there is something unmoved *haplōs*²⁶ outside the animal, pushing off against which the animal will move (698^b8 ff.)—i.e., some medium that is stable and is not moved with the creature even accidentally, as are the various resting points in the joints. Aristotle is not showing here that for animals an external *origin* of motion is required, but only that they need a resting stable medium. He takes the earth as his prime example: if it is not “at rest,” but slips away as sand does, one cannot progress—nor, he adds, can there be flying or swimming without resistance from the air or sea (698^b15–18). The cases of water and air make it clear that in arguing for something to offer resistance he has not really argued for something *unmoved*, as he seems to claim. Even in the case of earth, there is always some erosion, and men do succeed in walking on sand, though with greater difficulty than on a more solid surface. The example of the boat that he offers in evidence would, if followed through in the way one might expect, show this: if one pushes the boat with an oar or pole while standing in it, it will not move, but if one pushes the oar against the external resisting medium, the water, it does move—or, for that matter, if one pushes a pole into the relatively unstable,

²³ On the contested reading *hē pros ho*, cf. note to 698^b1.

²⁴ 255^a12 ff.; and cf. *IA* 3, *Ph.* VI.10.

²⁵ *DC* II.8, 290^a29–b8.

²⁶ On *haplōs*, cf. note on 698^b9.

but still resistant, sand under the water. Neither the water nor the sand would need to be unmoved. But instead of this obvious contrast, Aristotle offers a different one: a man standing on the shore and pushing the boat with a pole (698^b22–25, 699^a9–11). The force of this choice is to emphasize the absolute stability and immobility of the resisting surface (the earth being supposed to be immobile).

Aristotle cannot finally be accused of the confusion between resistance and absolute immobility that his example seems to suggest. *Haplōs ēremoun*, as we saw, need mean only “not moved with the animal, even accidentally.” The phrase to *houtōs akinēton* (“the unmoved in this way”) at 698^b20 may indicate that he is using the word in a qualified sense. Elsewhere in the passage he speaks not of the unmoved, but of that against which the moving being *apereidetai* or *apostērizetai* (698^b19, 699^a3, 5, 6, 9, 10). At *IA* 705^a7 ff., he very clearly recognizes that in cases of animal motion it is only a relative stability that is required:

In both these changes the animal that moves makes its change of position by pressing against that which is beneath it; and so, if the latter slips away too quickly to allow that which is setting itself in motion upon it to press against it, or if it offers no resistance at all to that which is moving, the animal cannot move itself at all upon it.

Why should the fuller treatment of *MA* 2 be apparently less subtle, leading us by its use of examples to suppose Aristotle thinks the medium must be absolutely unmoved?

Having observed early in the chapter that the question he has broached will have implications for the study of the heavens (698^b10–12), Aristotle seems anxious here to tailor his treatment of animals to make the analogy seem closer. He will, for the heavens, try to show that what is required is not just a resisting medium that may or may not be in motion, but instead an entirely motionless (bodiless) substance. The picture of the man standing on the shore and pushing the boat with a pole offers a closer parallel to the activities of the first mover than

the picture of the rower, since in the former case the mover is not a part of the moved system any more than the resisting surface is. Aristotle will use other arguments to show the difficulty involved in supposing the mover and necessary resistance for heavenly motion to be within the system itself. But here he prepares us for his conclusion with a persuasive analogy.

The analogical argument that will preoccupy Aristotle in the chapters that follow has been set up. And chapter 2 has also advanced the direct argument by showing us another and deeper reason for thinking of animals as similar to “boats and things that are not formed by nature.” Like boats, they are, as wholes, dependent on what is wholly external to them for their motion. (The example of the pushed boat may well be a deliberate allusion to the *VIII.4* parallel.) They cannot begin moving just anywhere, in any circumstances, from a state of rest; they require a resisting medium. To explain the motion of animals we must, then, look at their environment, to see why and how it meets the conditions of stability required for such motions. We must study the animal not in isolation, but as part of an integrated total situation. This part of the direct argument is not developed more elaborately in the *MA* itself—perhaps because *GC* II.10 had already shown at length how cyclical heavenly motion is a necessary condition of the continuity of change in the sublunary sphere.

Chapters 3 and 4: the arguments for an external unmoved mover

In chapters 3 and 4, Aristotle develops the analogical argument, drawing on the observations of chapters 1 and 2 and on the findings of the *Physics*. Assuming that there is something that moves the heavens as a whole, he will attempt to show that it must be unmoved and no part of the moving system.²⁷

- a) It cannot be a part of the moved sphere itself.
- b) It cannot be a moving body in the system using as its resisting surface an unmoved body within the system.

²⁷ For the confusions imported by the phrasing of the opening of chapter 3, cf. notes *ad loc.*

c) The mover cannot be a moving body in the system in any case, even granting it "pressed on" something outside.

d) So the necessary condition and *archē* must be one (bodiless) mover outside the system that does not impart movement by exerting, itself, any force within the system.

Natural motion is taken here to be dependent on self-motion; ultimately, it is argued, on the unmoved; and some misleading arguments of the *DC* about the immobility of the earth and the self-sufficiency of natural motion are revised, thus preparing for the discussion in subsequent chapters of how the object of desire imparts motion.

a) The heavens not moved by a part or point of the *primum mobile*

The first argument of the chapter (699^a17–24) is directed against the claim that the circular motion of the heavens can be explained with reference only to the heavens themselves. Addressing itself to the second alternative stated at the opening of the chapter—that the mover is unmoved "from the first" (699^a16)—it claims that in that case it cannot be part of what is moved. The heavenly sphere, unlike the animal (cf. *supra*), cannot be regarded as articulated into parts, some of which have *dunamis* for motion and act as the unmoving sources of that motion. It is homogeneous and continuous, so no part could be at rest; and those who claim that hypothetical "poles" in the whole are the sources of the power that sets it going, although they do not err by claiming an unmoved *part* in the whole, thus chopping a continuity into parts, still are just as deeply in error when they attribute *dunamis* to points, and ascribe to a single simple motion a double origin.²⁸ It is not clear whether Aristotle thinks that in refuting the part-theory and the pole-theory he has ruled out the possibility that the sphere is in some sense self-moving—i.e., that its natural motion alone is responsible for everything, so that it would at the most require an unmoved necessary condition, and not

²⁸ See notes for a more detailed analysis.

an unmoved *archē*. But we are prepared to find the theory of natural motions subject to review and qualification, and this will finally be done in later arguments relying on some conclusions from the *Physics*.

b) The heavens not moved by a moved mover "touching" an unmoved body within the system: the myth of Atlas.

Perhaps the most interesting example of how Aristotle uses the analogy to animal motion to illuminate and refine his cosmological conclusions is to be found in the criticism of the Atlas-theorists which follows.

If the unmoved surface that is necessary for movement cannot be a part of the heavenly sphere, a pleasing alternative would seem to be that it is the earth; the *DC* has argued at length that in order for the heavens to move eternally in a circle there must also be earth remaining at rest at the center (II.3). Aristotle never considers the possibility that the earth, in virtue of some *dunamis*, might itself be the mover, as well as the resisting surface: its natural motion is towards the center and it rests there in a state of equilibrium. But he does consider worth debate the suggestion of certain thinkers that a body pressing against the earth might originate motion. This looks reasonable, since the earth is, in fact, at rest (699^a27–31). The theory even appears acceptable by the standards set in Aristotle's initial statement of alternatives at the chapter's opening: the Atlas mover will not be entirely unmoved, but rather a moved mover pressing against something unmoved that is, itself, no part of the mover (699^a15–16). In the light of the rejection of the Atlas theory, this alternative will have to be clarified: what is unmoved must be no part, not only of the mover, but of the whole system that is moved. Like the necessary condition of chapter 2, it must not be moved even incidentally with the moving body.

Against the Atlas story²⁹ Aristotle uses two main arguments.

²⁹ The note on 699^a27 discusses the background of the myth: its sources, other Aristotelian uses of it, the differences between this version and the standard form of the story, the possible identity of the Atlas-theorists.

First, if the proponents of the theory wish to treat Atlas as a radius, the earth as an immobile center, they must admit "that the earth is no part of the universe" (699^a32-33). Secondly, they must, in order that there be the requisite balance of forces, understand the earth to have a "power of stability" that is equal to the force exerted by all the heavens and Atlas together. Otherwise, the earth will be moved from its place (699^a33-b10).

The first objection strikes us as peculiar. All that Aristotle's previous arguments allow him to say is that if the mover pushes off against the earth, the earth can be no part of the system that he moves. That is, he must be like the boat-pusher standing on the bank of the river, not the boat-pusher standing in the boat. But since Aristotle, both here and elsewhere, describes the earth as immobile, not even rotating together with the motions of the heavenly sphere, he seems to have no justification for his objection. The earth can perfectly well be a part of the universe, so long as it is not a part of the system that is moved. In fact, in the *DC* Aristotle has argued that the earth is, indeed, analogous to the point at rest in the center of the circle. Because heavenly circular motion implies the existence of such a center, and yet such a center cannot be a part of the moving heavens, or the continuity of their natural movement would be disrupted, there must be an earth that is immobile at the center and is no part of the moving system of the heavens:

Why, then, is the entire body of the universe not of this kind? Because it is necessary that when a body revolves in a circle some part of it remain still—i.e., that which is at the center; but no part of *this* body can remain still, neither at the center nor anywhere else. If it could, its natural motion would be towards the center; but in fact its natural motion is circular . . . Then it follows that there must of necessity be earth; for this is at rest at the center (*DC* 286^a12-21).

The trouble with this argument is that it treats the earth like a point and not a body. It is admissible to talk of an unmoving point as the *archē* of circular motion in some abstract circle,

since mathematics do not move (cf. 698^a26-27)³⁰, but, as *MA* 1 also teaches us, any body with magnitude that serves as a center is going to be divisible, and we will, indeed, have to admit that one point in a joint moves. The preceding argument of *MA* 3 also pointed to the error in confusing a point with a substance. The earth is more like the hub of a wheel, if we retain the *DC* picture, than like a geometrical point. On this view it will have to be moved, and will remain unmoved only at a hypothetical point. But Aristotle wants an immobile earth for other reasons; and his arguments for its immobility depend far more on his doctrine of natural motions than on his theories about heavenly motion. It is, therefore, the picture of earth as hub that needs correction. And the *DC* errs by not recognizing, or, at least, not recognizing consistently, that the necessary condition for the circular motion of the heavens is not an immobile center, regarded as a part of the system, but an immobile substance outside the system, which itself provides the *archē* for the heavens' course.

Aristotle's objection thus has the following force: the Atlas theorists present a picture that seems reasonable enough: the earth as immobile center, Atlas as radius, the heavens as circumference. But their picture commits them to making the earth a part of the moving system, like the hub of a wheel. But a wheel is set in motion not by a spoke, but by an external source of motion, and presses not against its hub, but against the earth. Once they cease to treat the earth as a hypothetical point and regard it as a body, their picture runs into difficulty: where is the unmoved *archē*? Surely it cannot be *literally* a point. Atlas, standing on the earth's circumference, will not serve as a satisfactory radius if the earth is in motion; the theorists must have a resting earth, but to have it they must admit it is no part of the moving system. Hence they must concede to Aristotle that the unmoved necessary condition is a substance outside of and no part of the system that is moved.

³⁰ See the note on these lines for a defence of the reading *kineitai* and a claim that this is Aristotle's own view, advanced in criticism of Platonic mathematics.

This conclusion points ahead to the arguments of chapter 4 that will claim that even this picture of a mover within the system pressing against something unmoved outside of it will not do: the mover cannot be within the system, or there will be a possibility that the whole could be destroyed. Aristotle does not, however, move directly to this argument, but first offers a second objection to the Atlas theorists that will hold not only against Aristotle's interpretation of their story (in which Atlas is a radius) but also against the more common picture, according to which he stands on the flat earth whirling a large dome over his head, supporting it at two points.³¹ In other words, it will rule out any version of the picture of an internal mover pressing against a body in the system, even one which employs a cosmology considerably different from Aristotle's.

The objection looks familiar. We recognize, or seem to, a germ of the motions of inertia, of action and reaction:³² the forces of the mover and of that which remains at rest must be equal. There is a certain amount of force in virtue of which what stays stays, just as the mover imparts motion in virtue of some force. Equal forces balance, but if one is superior it "overcomes" the other (699^a32–b1). Consequently, any internal moved mover pressing against the earth can press with no more force than that which the earth can withstand, or it will push the earth from its place. But Atlas, being himself at first at rest, must overcome his own inertia as well as that of the heavens, so that the inertia of the earth must be as great as the sum of the forces required to move Atlas and the heavens, i.e., the whole cosmos with Atlas in it.³³ Aristotle takes this to be impossible, the earth being small and it having been shown in the *Physics* that the force required to move the heavens and keep them going

³¹ Buridan and others present the whirling-dome picture as an interpretation of Aristotle, but Burley correctly remarks, "Sed illud est derisorium, si intelligatur secundum quod verba praetendunt."

³² On problems with the attempts (e.g., of Torraca) to get such physical laws out of Aristotle's natural motion system, see note on 699^a32–33.

³³ On the text and interpretation of this difficult passage (699^b6–8) see notes on it, where it is argued that this (also the interpretation of Michael) is the only plausible view of the passage.

through time is not even finite. This infinite force cannot be exerted by any body, since there is no infinite body (though the *MA* argument so far calls for only a very great finite force, and does not rule out the possibility of an external bodily mover).³⁴

The argument seems close to the discussions of *Physics* VIII, but, like those discussions, is rather difficult to harmonize with the statements of the *DC* in the passages just discussed. For on the *DC* view, it is mistaken to suppose that there is any force required to move the heavens or to hold them in place: the motion of the fifth body is natural. It is without weight and stays on high because that is its natural place. Arguments about action and reaction that seem appropriate to animal bodies moving on an earthy surface do not seem to transfer happily to the activity of the heavens.

One could say, first of all, that Aristotle is arguing dialectically, using his opponents' own cosmology: they do not admit the heavens to be naturally moved and speak of their matter as comparable to the matter which makes up the earth; they are consequently vulnerable to arguments about weight and force. If this were the case, the heavens might still be self-sufficient and have no need either of Atlas or of an Aristotelian unmoved external mover. It has been argued that this is, in fact, Aristotle's own position in the *DC*.³⁵ Though I do not think this acceptable as an overall interpretation of that treatise, there are passages that suggest this view, and no one could deny that there is far less attention given to the unmoved mover, far more to the natural motion of the spheres, than in *Physics* VIII, *Metaphysics* XII, or the *MA*.

But I think it would be wrong to maintain that the *MA* objection here is simply dialectical, leaving open any picture of heavenly motion that does not attribute weight to the heavens. The points about force and weight seem to be seriously introduced, and the closeness of this passage to some in the *Physics*

³⁴ Cf. *Ph.* VIII.10.

³⁵ For example, by Guthrie, "The Development," and *DC*, xx–xxxvi, and by von Arnim, *Die Entstehung*. The counterargument is most thoroughly and ably set out by Cherniss, *Aristotle's Criticism*, Appendix X.

suggests that its promising observations were not regarded by Aristotle as irrelevant in the context of his own cosmology.

The *Physics* and the *MA* seem to differ from the *DC* in their emphatic claim that it requires some external force to move the heavens,³⁶ despite their natural motion, and that natural motion is hence insufficient to account fully for the motions of the spheres.³⁷ Two considerations raised by the arguments of these treatises may have prompted this conclusion. *Ph.* VIII.4 argues (and *MA* 4, 700^a16 ff. will second its claims) that an element moving naturally is not genuinely a self-mover; only because the four elements are constantly interacting in the sublunary sphere are they in motion. They can be regarded as things moved by something else: that which compels them, in the case of unnatural motion, or that which removes an obstacle to their natural motion.³⁸ One could infer from this that the heavenly sphere, too, regarded simply as elemental, must have a mover. But this would be a very vague argument, since if the body undergoes no qualitative change, and there is no impediment to its motion, the need for a mover would seem in this case to have been obviated.

The second consideration is easier to understand, if not fully to justify. From the *DC* on, Aristotle wants, on general teleological grounds, to say that the heavenly spheres are alive.³⁹ *Qua* alive, they are (quasi-) purposive movers, and the best explanation of their movements is teleological. Both *Metaph.* XII and *MA* 6 insist that they require an external object of desire to account for their eternal circular motion. The objection against the Atlas theorists can be rescued from the charge of being sheer eristic if it is admitted that when Aristotle wrote this chapter he believed that to argue for weightless heavens, given the premise of their divinity, committed the philosopher to accepting the existence of an external unmoved mover who

³⁶ *Ph.* VIII.10.

³⁷ See Guthrie, *DC*, xxx-xxxi.

³⁸ See note on 700^a11.

³⁹ Cf. *DC* II.12, 292^a18-21. Cf. also *Ph.* 256^b2, 259^b30-31, *DC* 270^b5 ff., 278^b14-15, 284^a32, *Metaph.* 1072^b28.

moves them as an object of desire. Only the existence of god outside the universe, the claim would be, can provide a satisfactory explanation for the presence of the divine spheres in the "highest place"; hence the Atlas-theorists, who place the origin of motion within the universe, are not entitled to avoid the absurd conclusions to which the second objection points by making their heavens weightless.

There are some problems with this premise. As we saw in Essay 1, there was good reason to think that a teleological explanation was valuable in characterizing the adaptive, self-maintaining activities of living bodies in a changing environment. It was the fact of environmental variety, and the organism's plastic response, that provided Aristotle with his best arguments in favor of grouping plants and animals together and in suggesting a common explanatory model for the activities of both. Plants are deemed living for good reasons having to do with their behavior. The same cannot be said of the heavenly spheres. They dwell in a changeless realm and are never required to adapt or vary their motions. Why should Aristotle, who argued with such perspicuity for teleological accounts in the sublunary realm, now seek to apply them where they do not, apparently, fit, on the grounds (alien, as it seems, to his general theory) that whatever is best and most perfect must have life? The living is assumed to be superior to the lifeless (*PA* 644^b22, *GA* 731^b27-31, *DC* 292^a18-21); the spheres are perfect and divine (*DC* 270^b5 ff., 278^b14-15); *ergo* they must be living.

But if the premise is not justified by the *DA*'s arguments about explanation and living creatures, the *DA*, too, very clearly assumes that the spheres are living creatures to whom the teleological model is applicable.⁴⁰ Despite the problems this view seems to cause for his arguments about behavior and explanation, Aristotle never considers rejecting the troublesome premise. Where does he get it and why does he consider it above criticism?

In every area of inquiry, Aristotle claims, the philosopher

⁴⁰ *DA* 402^b6, 414^b18.

must set down the "appearances"—the data provided in our talk about the world, our observations and theories—and erect a theoretical account that will "harmonize" with these, "saving" the largest number and the most important (*EN* 1145^b3–6).⁴¹ We have seen how the entire *MA* project arose out of the need to ensure that the cosmological arguments of the *Physics* harmonize with the *phainomena* of animal motion. One of the most basic of the appearances in Aristotle's world was a belief in the existence of living gods and a conception of them as inhabiting the lofty heavens:

All men have a conception of the gods, and all assign to the divine the highest place, both foreigners and Greeks, as many as revere the gods. . . . If, then, there is something divine, as there is, what we have said about the first bodily substance has been well said (*DC* 270^b5 ff.).

For Aristotle's "as there is," he has no support but popular belief; and this belief provides, in the *DC*, his only reason for locating the fifth body above the sublunary world.⁴² This is one of the appearances that Aristotle does not think of questioning; no universally held belief ought, he believes, to be questioned (*EN* 1172^b36–73^a1, 1153^b27 f., *EE* 1216^b26 ff.). He will concede that much of what we say about the gods has only an aesthetic and a utilitarian value, but our belief in the divinity of the heavenly stars is, he insists, a divine belief that has survived many cycles of human civilization.⁴³ Often Aristotle can find physical arguments to back up our convictions; and this is, of course, welcome. Having argued for the eternity of the universe, he shows how argument has saved the appearances:

⁴¹ On the *phainomena*, see further in Introduction, Essay 5, and Owen, "Tithenai." On the necessary harmony between our theoretical constructs and the *phainomena*, cf. note on 698^a13 ff., and Introduction, n. 2.

⁴² The argument from natural motion, as has often been noticed, does not give us the *place* of circular motion; unlike rectilinear motion, it is motion *in*, not *towards*, a natural place. Cf. Cherniss, App. X; Solmsen, *Aristotle's System*, 281.

⁴³ *Metaph.* 1074^a38 ff. On the cycle, cf. *Meteor.* 339^b19 ff., *DC* 270^b19–20, *Pol.* 1329^b25 ff.

Therefore we may feel convinced that these ancient beliefs, so much a part of our culture, are true . . . Our ancestors assigned heaven, the upper region, to the gods, believing that it alone was deathless; our present argument bears witness that it is indeed imperishable and ungenerated (*DC* 284^a2 ff.).

But where no independent arguments can be adduced—as is frequently the case in cosmology—we must confront obscurity by asserting the *phainomenon* (*DC* 291^b24), and be content if our picture is both self-consistent and in harmony with common beliefs (*DC* 283^a35–b5).⁴⁴

We usually feel at home with Aristotle's appearance-saving, his careful attention to ordinary language and ordinary beliefs. We are much less so when it is a question of religious faith, and especially when that faith alone is used to support scientific claims. We imagined we knew what Aristotle was up to, and that his preoccupations were ours. And now the meticulous analyst is found constructing a picture of the heavenly bodies on the basis not of careful observation and measurement, but of popular superstition. The "scientific man" of our epigraph (cf. Introduction) who strives for an adequate explanation of all phenomena, no matter how mysterious, seems to have been replaced by the "religious man" who fights for the right of the supernatural to remain unexplained, of the marvelous to remain unchallenged by reason. To use bare assertions of faith at crucial steps in an astronomical argument may strike us as irresponsible, even though we grant that an inquiry into substance or the explanation of change must begin from the data of our ordinary beliefs and talk about the world. Aristotle never attempts a proof of the existence of God. (The *existence* of an unmoved mover is, of course, argued for elaborately, but his life and divinity are nowhere established by argument, as is also the case with the spheres.) His medieval heirs, despite their great reverence, felt called upon here to substitute rational argument for the master's deference to the beliefs of "the many and the wise."

⁴⁴ On the difficulty of the subject, cf. also *PA* 644^b31–35.

This is not the place to attempt a thorough study of Aristotle's most basic "appearances," or to ask where the existence of god fits on the continuum that takes us from the principle of non-contradiction, which anyone who makes any assertion must concede, to scientific principles which are fully open to debate, criticism, and revision. The belief in god is certainly a very basic appearance, though perhaps not as basic as the existence of change, which can be neither sensibly questioned nor proved from anything more fundamental in our experience.⁴⁵ Would Aristotle wish to claim that our belief in god is a first principle to be held contextually *a priori*—in that to doubt or reject it would generate large problems for the fabric of our day-to-day life and speech, or ordinary explanations of natural events? This is what he seems to believe about change; and it is his reason for rejecting both Parmenidean doubts and Platonic attempts at proof and justification. Would he say of god, as he does of *phusis* in *Physics* II.1, that the attempt to argue for something so basic to our experience of the world is fundamentally misguided and must involve going outside what we can possibly know from our own lives?

There are indications in the passages cited above that Aristotle does think that the belief in heavenly divinities (unlike other aspects of contemporary religion) is basic in something like this strong way. But this position is a controversial one, and one that is nowhere fully developed. Is religious belief really universal? And, if so, is this a good reason for holding it as basic? Surely the atomist picture of the universe, which does not invoke the gods, is not fundamentally at odds with our daily lives and beliefs as is the Eleatic denial of change. And yet Aristotle appears committed to assimilating the two, as types of nonsense generated by denial of a basic *phainomenon*.

⁴⁵ *Ph.* 193^a3–9: on the absurdity of attempting to prove the existence of *phusis*, Aristotle remarks that it is as though a man blind from birth tried to construct a syllogism whose premises concerned colors—i.e., whatever premises would be invoked in such a demonstration, they would be bound to be outside our experience, and we would be proving "the evident through the obscure." Cf. also *Ph.* 184^b25–85^a14; *Metaph.* 1006^a3–11, *DC* 298^b18 ff.

But if Aristotle's position on this central issue must remain not fully clear, the issue as we *are* able to articulate it shows us a good deal about his attitude towards the opposition between science and metaphysics sketched in our epigraph (cf. Introduction). He holds, of course, that a scientific discipline should not leave explanatory gaps that might possibly be filled, or be content with a partial explanation where an adequate one might be found. But he holds, too, that explanation must stop somewhere—and that beneath the demonstrated we arrive at what all men believe. In cosmology, our astronomical demonstrations must rely heavily on the data of common belief, just as in physics we rely on our intuition that Parmenides' account is false.⁴⁶ There is no sharp line between the "scientific" and the "metaphysical," between what can be demonstrated and that of which we simply say "let it underlie"; it is neither helpful nor wise to separate the "scientific" questions from those that rest on our intuitions and interpretations. The scientific depends on what appears, and what looks most solid is so not because it is free from interpretation, but because it is based on the most universal and fundamental interpretations. When we realize this, we may be tempted to lapse into silence: to say anything at all is rash. But Aristotle opposes this step as well: to assert the *phainomenon* is a proof, in such cases, not of over-boldness, but of self-respect.⁴⁷ The philosopher who combines eagerness with

⁴⁶ *Ph.* 185^a12–^b13 "Let it be our underlying principle (*hupokeisthō*) that things that exist by nature are (either all or some of them) subject to change. This is clear by induction from experience."

⁴⁷ *DC* 291^b25–28: "We must try to assert the *phainomenon*, considering the readiness to do so a mark of *aidōs* rather than of rashness, if someone out of his thirst for philosophy is content with but a little progress in matters concerning which we are surrounded by the greatest obscurity." *Aidōs* is usually here rendered "modesty," but "(self-)respect," a sense at least equally common (more common in Aristotle) seems more plausible. It would be modest to say a little rather than too much. But the choice here is also, it appears, between saying a little and saying nothing at all, and the question is whether even a little, in such difficult matters, is too bold. Where we cannot be precise, the imaginary opponent claims, we must be silent. Aristotle answers that philosophical self-respect requires an attempt at speech, and the best explanation we can offer.

aidōs will neither give up in the face of difficulty nor scorn the appearances. The Eleatic metaphysician forfeits not only the hope of progress, but even, in some way, his own self-respect as a philosopher, since he heaps contempt on all that we and he are and say—on the data of philosophy. Philosophical self-respect requires that we never pass over important matters in silence when experience offers us words to characterize them and never leave the unexplained completely in the dark, if the common speech of men sheds a little light.

There are many who believe that Aristotle did not—at least in his early work—believe that the appearances were enough, and who tried to provide a very different basis for scientific demonstration, one which would be a priori not just contextually, as the basic appearances are, but in a stronger sense. The theory of *nous* in *APo* II.19 is supposed to provide such an a priori basis. This seems to me a mistaken view; and I plan at another time to work out more clearly the connections between this chapter and the theory of the basic appearances. But it is the theory of the appearances, rather than any stronger notion of the a priori, that clearly provides the crucial premise in the Atlas argument: the weightless heavens must be living and imply by their very existence and motion the existence of the unmoved god.

- c) The heavens not moved by any mover within the system, whether or not the resisting necessary condition is inside

So far Aristotle's arguments would not show that there could not be a mover within the system that moves it all—only that the necessary condition for motion, whatever it “presses against,” must be outside. The possibility of there being a great unmoving bodily mass outside the universe might be taken to be ruled out *ex hypothesi* by the designation of what is moved as *to pan* (698^b12, 699^b34) and *hē holē phusis* (699^a25). But *Physics* VIII does seem to consider it requires a separate argument, having demonstrated the existence of the external unmoved mover, to show that the mover must be without body (chapter 10). Aristotle might have argued directly, using the arguments

of the *Physics*, for the impossibility of any bodily mover; this would have ruled out any mover in the system, since animal souls are clearly unfit for other reasons. But Aristotle never argues in the *MA* that the first mover must be without body. His concern is to establish that it must be outside the universe, entirely unmoved, and one with movement's necessary condition. Having treated the mechanical condition and the mover as possibly separate, as the *Physics* is not concerned to do, he now will attempt to show that not just one, but both, must be external to the moved—and that both must be one. Aristotle does not leap to the arguments of *Ph.* VIII.10 because of his interest in setting forth the various possibilities, and rejecting them, systematically.

The arguments of chapter 4 are obscure, but clearly a new point is being made: the problem is not *one* with what went before, but just “closely connected” (*oikeian*, 699^b13). Aristotle drops for the time the question of what surface will be powerful enough to resist the Atlas figure. The picture of motion to be criticized is any one in which the mover exerts force within the system to move it. It will take only a finite force to move the earth from its place (699^b15–17), so we cannot use arguments against infinite body to deal with the problem. The point seems to be that we can see in the case of Atlas that the moved had to exert tremendous force—enough to overcome the inertia of the entire system. This particular picture was ruled out because Atlas would move the earth. But even if things were arranged so that he did not actually press against the earth, but against some suitable external body, no part of the whole that is moved, his force would still be great enough potentially to wreak havoc with the order of the system. If we let into our natural system these “overwhelming motions” (699^b25–26), even though we explain their function as being one of moving the whole round in an orderly way, we will have no way to rule out the possibility that the order could be destroyed. Instead of explaining how the system, in and of itself, is organized to function optimally, we will have introduced an extra entity that could upset the economy of the natural system. We do not need such an entity, as Aristo-

tle will argue, to explain motion, and if we introduce it, we let in the possibility that it could at any time put the whole in disarray. Aristotle wants to show that the universe functions as an organic whole, according to necessary laws, and is not governed by the whim of an "overwhelming" mover within the system itself. The sort of anthropomorphic caprice supplied by Atlas, and any such mover, is not what is wanted: it seems paradoxical that the mover should be within the system (699^b35–36). As an alternative to bad anthropomorphic fables, Aristotle cites the Homeric remarks about the immobility of Zeus, highest of all, suggesting this tale of an *archē* wholly unmoved will provide a satisfactory answer to our worries about dissolution of the heavens (699^b36–700^a6).⁴⁸

Thus, through the early chapters of the *MA*, Aristotle has used his study of animals both to assure us that they are not a problem case for the arguments of the *Physics* and to establish by analogy some conclusions about the heavens. His direct observations in chapters 1 and 2 are turned in chapter 3 against the misguided anthropomorphic picture of the Atlas theorists, as well as against his own earlier account, which erred by implying the earth was the only unmoved substance required for heavenly motion. Both strands of argument will have to be completed in the section of the treatise dealing with the teleological explanation of motion: animals will be shown to depend on an external "unmoved mover" and hence not to be problematic self-movers, and the heavens will be seen to be moved in an analogous way by a first mover that is not "relative to something else" (700^b35). The links between heavenly and animal motion will be argued in Essay 3 to be crucial, at least zetetically, for the theory of soul and body presented in the treatise. The arguments of the *MA* that link cosmology and biology are often puzzling, and occasionally the analogy obscures, rather than illuminating, the picture—as in the confusing introduction of *thigganein*

⁴⁸ In his commentary on this passage; Buridan remarks that it is because of the thoroughness of the arguments of *Ph.* VIII that Aristotle cites only Homeric authority here.

("touching") at the opening of chapter 3.⁴⁹ Furthermore, the cosmological arguments all depend on fundamental beliefs about the divinity of the heavens. But still there is enough comprehensible argument here for us to see what Aristotle was after when he launched this interdisciplinary study and what conclusions it might be hoped to yield.

The prologue to the *Meteorologica* had suggested that once the subject of natural change had been given a general treatment, the best procedure for the scientist would be to go on to a consideration of how these principles apply in each area of natural study. The natural sciences were conceived of as departmental, neatly and schematically divided—and, moreover, there seemed to be a preferred order of study, moving from cosmology through element-theory to meteorology, and, finally, to biology. The *APo* explicitly forbade the scientist to use the conclusions of one science in establishing the principles of another. The *MA* constitutes a revision and a criticism of this picture of the sciences: physics and cosmology both are seen to be dependent for the securing of their general principles on the findings of biology, which Aristotle had had to defend in the *PA* against the objections of those who apparently found it a base and disgusting sort of study.⁵⁰ Aristotle seems to be acknowledging that, though the divisions among different branches of inquiry may be useful in pursuing an initial *zētēsis*, there are cases where principles cannot be firmly established without invoking the findings of a related discipline. And, though the treatise has shown in most detail how the cosmologist depends on biology, both chapter 2 (with *GC* II. 10) and later arguments, which we shall discuss in the following essay, show the dependence is mutual: the biologist, far from being a man of narrow concerns whose base objects of study—flesh, blood, and bones—have made him unfit for the true theoretical life, must himself be a cosmologist or he will not be able to solve some of the most pressing problems of his discipline. He cannot rest with the results of his specific inquiries, but must go on to produce a

⁴⁹ See note to 699^a14–15.

⁵⁰ *PA* I.5, especially 645^a27 ff.

"common account" that will yield some broad general conclusions about animal behavior and depict animals as a part of a naturally ordered environment, all of whose parts are in complex ways interdependent. When we have examined the later arguments, we will be in a position to draw some general conclusions about the *MA* picture of the sciences.

ESSAY 3

THE *SUMPHUTON PNEUMA* AND THE
DE MOTU ANIMALIUM'S ACCOUNT
 OF SOUL AND BODY

One of the thorniest exegetical problems confronting an interpreter of the *MA* is the theory of the *sumphuton pneuma*, or innate breath, presented in the treatise's penultimate chapter. The theory is internally obscure, one of a series of cryptic pointers towards a fuller account of this *pneuma* that Aristotle may have planned, or even composed, but which does not survive.¹ But even if one manages to make internal sense of it, it remains very difficult to see how the tenth chapter fits together with the theory of motion presented in the rest of the treatise. Two questions immediately suggest themselves: (1) What is the connection between *pneuma* and desire (*orexis*) that is suggested in the opening sentences of chapter 10? At the end of the account of *pneuma* Aristotle writes, "We have said what the part is in virtue of whose motion the soul imparts movement, and what the reason is" (703^a28–29). What does this mean, and what are the implications of this claim for our understanding of the treatise's theory of soul? (2) What part does this mysterious stuff play in the account of animal physiology presented in chapters 7 ff., and why does Aristotle feel it necessary (*dei*, 703^a6) to introduce an extra, apparently non-empirical, component in addition to the ones he has already described?

Jaeger and Düring, the only modern writers who have attempted to provide a comprehensive account of the argument of the *MA*, both hold that a central aim of the entire treatise is to show the importance of *pneuma* in explaining animal motion.² They point to the *De Anima* forward reference ("But as for the

¹ For general accounts of *pneuma*, cf. I, Chapter 1, n. 17, and *infra*, n. 2.

² Jaeger, "Pneuma," I–II; Düring, *Aristoteles*, 345.

tool (*organon*) in virtue of which desire imparts motion, this is already bodily; so we must consider it when we deal with the functions common to body and soul," 433^b19 ff.), and to 703^a28–29 (cf. *supra*), which announces the completion of the projected task, as evidence that everything that precedes prepares the way for this chapter, the treatise's primary contribution to Aristotle's psychology.

If this is correct, we might expect to find indications in earlier chapters that there is a gap in the account of motion that can be filled only by an innovation like the *pneuma*-theory; or, at the very least, once we reach chapter 10, we might expect to be able to see clearly how it completes the elaborate earlier account. In fact, from the point of view of both of our questions, it is extremely difficult to see what chapter 10 contributes. The account of motion offered in chapters 6–8 appears to be complete and intelligible without further supplementation. The teleological account tells us that desire "prepares" bodily *pathē* (702^a10 ff.) and that perceptions and *phantasiai* are, of necessity, accompanied by bodily heatings and chillings, which, in their turn, lead directly to expansion and contraction of the limbs (701^b13–19, 23–24, 34–702^a5). Whatever this "prepares" and this "accompanies" mean for Aristotle's theory of mind, it appears that there is no difficulty in telling how, when an animal sees and desires an object, this desire is translated into motion. On the physiological side, Aristotle emphasizes repeatedly that the body is constructed so as to be able to carry out complicated motions rapidly upon a simple change in an internal part. The examples of the automatic puppet and the child's cart (701^b2 ff.) indicate that all is in such good order in the animal body that a simple heating or chilling in the heart region will become, automatically, the varied and complex motions that we observe. The first section of chapter 8 ends with what appears to be a final summary, answering both the psychological and the physiological questions:

Since these processes happen this way, and since the passive and active have the nature that we have often ascribed

to them, then whenever it happens that there are both active and passive elements, and neither falls short in any respect of the account we given of them, at once one acts and the other is acted upon. That is why it is pretty much at the same time that the creature thinks it should move forward and moves, unless something else impedes it. For the affections suitably prepare the organic parts, desire the affections, and *phantasia* the desire. And *phantasia* comes about either through thought or through sense-perception. The rapidity and simultaneity result from the fact that the active and passive are naturally relative to each other (702^a10–21).

Once desire has "prepared" the initial bodily alteration, the limbs are moved because of the body's own nature. If there remains any *aporia*, if any essential factor has been omitted, Aristotle does not bring it to our attention, but turns instead to an expansion and correction of his account of joints.

But chapter 10 is clearly telling us that an important part of this picture has yet to be discussed. Now that we have spoken of desire, we must (*dei*) go on to speak of *pneuma*, the bodily moved mover (703^a4–6), the constituent in virtue of which desire imparts movement (703^a28–29). All animals clearly have *sumphuton pneuma*, from which they derive strength (703^a9–10). Located in the region of the heart or its analogue (703^a15–16), it is well-suited by nature for imparting movement and supplying strength (703^a18–19), for it is capable of expanding and contracting, pushing and pulling, without constraint, and is heavy in comparison to the fiery, light in comparison to its opposite (703^a23–24). This sketch is followed by the comparison of the animal to a well-ordered city (703^a29–b7)—as though only the presence of *pneuma* completed the account of soul and body, ensuring the orderly, city-like functioning of the organism. We have been told that expansion and contraction are set up as a direct result of heatings and chillings. Now we learn of a special stuff whose particular nature it is to expand and contract. Awareness of the object of desire seemed to be accompanied by simultaneous alterations in the part around the heart. Now we

learn there is this mysterious *pneuma* located near the heart that does not undergo alteration, but has a close connection of some sort with desire.

Our first response is to suppose that chapter 10 does not belong with the rest of the treatise, that it is irrelevant to, perhaps even inconsistent with, the account of bodily motion in chapters 6–8. We wonder if it is not an interpolation—perhaps from a later hand, or, since *pneuma* also clearly plays a major role in the *GA* and the *PN*, an addition made during a later phase of Aristotle's career, and never fully incorporated into the text. But if we look more closely at the two questions we have raised, we find that, in fact, they do admit of an answer that makes of chapter 10 an integral, even a necessary part of the *MA* argument. For the account of animal motion in chapters 6–8 is not as complete as it might at first appear. Both the teleological account and the analysis of bodily movement reveal substantial internal difficulties, both of which the theory of *pneuma* helps to resolve. It clarifies the account of motion towards an object of desire by making it clear that desire, like *aisthēsis*, is a functional state of matter and not some Cartesian incorporeal agent, quite literally using the body as a tool to effect change in the world. It supplements the physiological analysis by adding to the usual four elements, with their limited repertory of natural motions, a more versatile constituent that helps to guarantee the body's organic unity.

THE *PNEUMA* AND HYLOMORPHISM

The answer to our first question must be closely bound up with an attempt to settle another problem. The psychology of the *DA*, as we have already described it in Essay 1, holds that soul is the form or functional organization of a certain kind of body and that the various "parts of soul" are functional states of matter. As biologists, we are interested in knowing in what sort of matter various bodily functions are standardly realized: that *aisthēsis*, for example, "is" a certain sort of physiological

change (*MA* 701^b17–18)³, that anger "is" the boiling of blood around the heart (*DA* 403^a31–^b1), that respiration "is" certain necessary interactions of hot and cold matter (*PA* 642^a32 ff.). But it is even more important that we should give a functional account of these processes that incorporates them into an analysis of the creature's self-maintaining activity. The "is" used in statements about the material cause is not the "is" of identity, since we must leave open the possibility that these functions can be realized in other kinds of matter, or material processes.⁴ Or rather we might say that the "is" of a *particular* statement might well be the "is" of identity—*this* act of perceiving just *is this* physiological change⁵—but that no more general identities should be postulated, since a certain function can always potentially be realized in different matter, even if it has not been so far in our experience.⁶ We might say, then, that the "is" of general claims such as "*aisthēsis* are a certain type of qualitative change" is the "is" of realization or constitution; we are saying that this function is usually realized in a certain physiological process, that *aisthēsis* is a functional state of matter, and that in the animals we know it usually has such-and-such a physico-

³ Cf. *DA* 424^a17, 425^b27, 426^a16, 427^a3, 431^a14, 19, 432^b1; on all this, cf. further in Essay 1.

⁴ Slakey, "Aristotle on Sense-Perception," assumes that if Aristotle can describe perception physically, the formal account is therefore otiose: "Aristotle tries to explain perception *simply* as an event in the sense-organs" (470, emphasis mine). Cf. Essay 1, the criticisms by Sorabji in "Body and Soul," 78, and the arguments of Taylor's "Mind-Body Identity."

⁵ Sorabji's "Body and Soul," generally a very stimulating article, fails to distinguish (1) between token and type-identities and (2) between statements identifying entities ("this house is bricks and mortar") and statements identifying processes ("this perceptual activity is a physical change"). He does not give us any reasons to suppose that Aristotle would not have fully identified a particular psychic process with a particular physical interaction. These identities would not conform to Leibniz's Law: Corippus' desire for revenge can be called excessive, or unjustified; the boiling of blood around his heart cannot. What is required is something like the "diacritical identity" defended in T. Nagel's "Physicalism," 105 ff., and postscript, 115–16.

⁶ Cf. *Metaph.* VII.11, and comments in Essay 1.

chemical character.⁷ In this way Aristotle can consistently both make what appear to be general identity claims and also say, more loosely, that psychic processes are "not without body" (*DA* 403^a5–7), or "always with some body" (^a15), that "together with these the body undergoes some affection" (^a18–19). The point of these latter statements is not to claim that there are two separate processes, somehow correlated, but to remind us that the function, which we characterize generally, is realized now in this matter, now in that. There is always *some* bodily affection that constitutes the process, but not necessarily the same one, though empirical physiology might suggest this. The most precise way of speaking of soul and body (cf. *DA* 408^b4 ff.) is to say that there are various life-activities of the creature, which we can characterize now functionally, now by specifying the usual material constituents. If we speak this way, we are not led to think that soul is and acts apart from body; it is something about a living creature, its functional organization, which is always in matter. If we want a general account, we look at the form, and speak of perception, desire, motion; if, as doctors or physiologists, we need more specific information about how particular beings work, we look for the material realization.⁸

But this hylomorphic view may not be the only one Aristotle ever held about the relationship between soul and body. Nuyens

⁷ The view taken here is very much like Sorabji's. But he applies to Aristotle's view of soul and body the distinction between identity and composition made at *Metaph.* 1041^b12–16, suggesting that the bodily constituents survive the dissolution of the substance (cf. also Wiggins, *ISTC*, 10–25). But Aristotle insists that the constituents of a living body and the constituents of the corpse that was that body are related only homonymously (cf. Ackrill, "Aristotle's Definition," 130). And further problems arise when we turn to a discussion of processes: the *alloiōsis* that realizes or constitutes this act of perception is not something that can survive the animal's death or occur in the same way outside of this living organism.

⁸ Thus when Aristotle asks, at *DA* 424^b16–17, whether smelling is not more than an *alloiōsis*, he would be asking not whether it has some non-physical component, but whether the formal account, which abstracts from the particularities of the matter, is not superior to and independent of any particular physiological account.

points to the conclusion of the *MA* discussion of *pneuma*, and especially to the city simile that follows, as evidence that he held, at the time he composed this treatise, a different and incompatible view: that the soul is a non-material substance, identifiable separately from body, that imparts motion to body using some part of it as a tool. *Pneuma* is this part, and its function in the treatise is to provide a lacking link between desire and the body, showing us the "meeting place" of the psychic and the physical in animal motion.⁹

Two problems immediately arise. First, Nuyens's account does not resolve the difficulty we have found in trying to read the treatise as a whole: in chapters 7–8, an initial change associated with perception caused, automatically, the succeeding changes leading to motion; in chapter 10, *pneuma* steps in to take a central role. Second, the passage of the *DA* to which the concluding remarks of the *MA* chapter plainly refer does, indeed, use "tool" language of soul-body relations, but in a way fully and plainly compatible with the *DA*'s hylomorphic view. "But as for the tool in virtue of which desire imparts motion, this is already bodily." Taken out of context, this might, indeed, suggest that Aristotle is claiming that soul is some sort of substance that causes bodily activities—Nuyens's "instrumentisme mécaniste."¹⁰ But read with the rest of the *DA*, it is not even seriously misleading. The soul was defined as the *entelecheia* of a *sōma organikon*; this phrase was offered in explanation of the phrase, "natural body potentially having life" (412^a27–^b1). A body can be (potentially) living only if it has an organic structure of a certain complexity; soul is the functional organization of such a body. Again, in *DA* II.4, Aristotle asserts that all the bodies of living beings can be called *organa psuchēs*, "tools of soul," in that they are "for-the-sake-of soul" (415^b18–20). To

⁹ Cf. I, Chapter 1 on Nuyens's view and general criticisms by Block and Hardie.

¹⁰ Because of this forward reference to the *MA*, Ross goes so far as to argue that *DA* III belongs to Nuyens's middle stage—see "Development," 67; *DA* 14, 316; and I, Chapter 1.

call a body or bodily part the "tool" of soul can, then, be just to ascribe a function to it, to say that it enters somehow into an analytical account of how the animal performs its life-activities: to do a job, the creature has to have some tools, and these are the tools that do such-and-such jobs. The forward reference in III.10 means, then, only that if we want to know what organic process it is that performs the function of getting the animal going towards his object of desire, we will have to wait until another time. Desire is a functional state of matter; if we want to know in specific terms what the stuff is that is usually in motion when the animals we are interested in are desiring something, we will be told when we reach the treatises that deal in more specific terms with animal physiology.

There is no reason, then, why "tool" language should be taken as evidence of instrumental dualism; we might just as plausibly take a statement that sight is the function of the eye to imply that there are two separate dispositions, sight and some state of eye matter, that stand in a causal relationship to one another. We have good reason to expect the *MA*, whose job it is to discuss desire's bodily "tool," to continue the hylomorphic account. In view of the mutual and well-embedded cross-references, we should assume compatibility with the *DA* except in the face of very strong evidence. Nuyens has, as we shall see, no such evidence; nor does his account appear to offer a coherent reading of the *MA* itself. We shall find that, on closer examination, the *MA* theory (including the city simile, when read in its context) is fully compatible with hylomorphism—and that the addition of chapter 10 removes the one potential obstacle to a hylomorphic reading.

Nothing said about the soul in *MA* 6–8 implies that it is separable and substantial. We find, instead of a claim that some object called *psuchē* is the mover of the animal, the claim that animals move in virtue of certain vital capacities: species of cognition and species of desire. Because of their role in the explanation of goal-directed motion, these are called "the movers of the animal" (*ta kinounta to zōion*, 700^b17). The account of the practical syllogism in chapter 7 says quite clearly that a certain

combination of cognitive and desiderative activities is a sufficient condition for motion; there seems to be no room here for a stage at which an immaterial resolve is translated into bodily movement. "That the conclusion is the action, is obvious" (701^a22–3; cf. 701^a12–13).¹¹ Unless Aristotle has omitted a transitional step of great importance, this clearly suggests that the perceptions and desires that are the "premises" of the syllogism are realized in matter. And Aristotle says explicitly that they are: "Perceptions just *are* some sort of alteration" (701^b16)—the language of the *DA*. Other statements, though looser, are equally clear: "The animal moves and progresses in virtue of desire or choice, when some alteration has taken place in accordance with (*kata*) sense-perception or *phantasia*" (701^a4–6). "Of necessity the thought and *phantasia* of these are accompanied by (*akolouthēi*) heating and chilling" (701^b34–5). Thoughts of painful and pleasant things are nearly always "with" (*meta*) some sort of heating or chilling (702^a1; cf. 3–5). Life-processes, functionally characterized, are "with" bodily change; bodily changes take place "in accordance with" a life-process—i.e., as required for the fulfillment of the function. This language is a careful and revealing elaboration of hylomorphism: life-processes are necessarily enmattered, so always *with* some bodily change, though not necessarily any particular one; bodily change realizes the function and takes place *in accordance with* it. We cannot read these passages as saying that the alteration is *caused by* sense-perception, etc. *Kata* is never causal in this way.¹² Nor have we any good reason to read a causal relationship into the "with" statements: Aristotle might have said "productive of" a heating or chilling, but he did not. If we are in any doubt, the clear recapitulation of the *DA*

¹¹ Cf. Essay 4.

¹² I am relying for this claim on Peter M. Smith's exhaustive survey (forthcoming) of all pre-Aristotelian uses of *kata*, which establishes this conclusion without any exception, and, for Aristotle's usage, on Bonitz, *Index*, 368^a–69^a and Eucken, *Praepositionen*, 38–46. William's *secundum* and Torracca's "secondo" are just right; Forster's "as the result of" ignores this evidence; Louis and Farquharson are also misleading, though more ambiguous.

position on perception ought to settle the point. The language is sometimes unclear; but no more so than most of the *DA*, which, without II.1–2, might be misread in many places.¹³

A number of potential obstacles to the hylomorphic reading can be readily dismissed. The opening posing of the question ("it remains for us to consider how the soul moves the body," 700^b10) is dialectical and states the problem in a familiar form, one of the most common characterizations of soul (cf. *DA* I) being as that which imparts movement. Aristotle refers back to the *DA* (700^b4–6) as background for this discussion. The claim that "*phantasia* and thinking have the power of the actual things" (701^b16 ff.) refers, as the sequel makes clear, to the power of these enmattered processes to cause large-scale bodily change (shuddering, etc.), not to the power of soul-events to cause body-events. The language is less clear than in the preceding claim about *aisthēsis* because the relevant physiological facts are less clear. The point is that with *aisthēsis* we know right away that it is bodily, since we can pick out the bodily alteration that usually realizes it. With *noēsis* and *phantasia*, it is not intuitively obvious that something bodily is going on; but the fact that the large-scale result can be the same as in cases of actual perception suggests that there is a bodily realization.¹⁴

Nor is the notorious city simile at the end of the tenth chapter in any way inconsistent with the hylomorphic view. It summarizes arguments advanced in chapters 8–9 to the effect that the unified functioning of the animal organism presupposes some single physiological center (the heart or its functional analogue) that will receive perceptual stimuli and initiate responses.¹⁵ In *Metaph.* VII.10, Aristotle associated with the hylomorphic view

¹³ For a general discussion of Aristotle's usage of ordinary expressions that might seem to imply a theory of soul different from his own, see Hardie, *AET*, chapter V.

¹⁴ On the relationship between *noēsis* and *phantasia*, cf. Essay 5. *Noēsantes monon*, "just thinking of something," is, then, to be taken as contrasting not what cognition can do alone with what it can do when backed by desire, but rather the effect of perceiving an actual object with that of thinking (or imagining) the same object, whether or not it is there.

¹⁵ On these arguments, see notes to chapters 8–9.

of soul and body the suggestion that there might be some part or parts "that are in charge and in which, primarily, are the definition and the substance" (1035^b25–6).¹⁶ To talk of soul as *eidos* is not, then, incompatible with seeing its functioning as "in" a bodily part; and "in" seems to have, here and in several similar passages,¹⁷ the sense of "causally dependent on." The integrated functioning of the whole animal depends on, or requires, the existence of some central, "guiding," bodily organ; to say that soul is "in" the heart is to say no more than that, for most animals, it is the heart that plays this central role. The *MA* speaks of the heart region as the bodily *archē* of, or for, the soul (702^a32, 702^b2, ^b16; 703^a12)—the part that realizes, in a primary way, the animal's vital activity—and says quite clearly that soul itself is "distinct from a magnitude of this kind, though it is 'in' it" (703^a3–4). The city simile (703^a28–^b2) does no more than to summarize this line of argument. The animal, like a city, can function as a mature, coordinated whole only if there is some physiological center that monitors all stimuli; we cannot explain goal-directed motion without positing some such center. There is "no need of soul in each part"—limbs and similar parts do not need to be separable animals in order to function well when attached. The parts live in virtue of their connection to the central organ and perform their various tasks because of their natural fitness for responding in consistent ways to changes in the center.¹⁸ If Aristotle makes a blunder here, it is not in connecting proper functioning of the entire creature with the states of some bodily organ—for one may even now be a hylomorphist without denying that the higher creatures require

¹⁶ On this passage, see Block, Hardie, "Relation," and Wiggins, *ISTC*, n. 61.

¹⁷ Cf. *Ph.* 210^b21–22 on the senses of *en*; also *Metaph.* 1023^a8–11, 23–25; *EN* 1109^b23.

¹⁸ The parallels cited by Nuyens and others as evidence of a period of "instrumentisme mécaniste" claim no more than this. *Juv.* 469^b13–17 says that the warmth of all the body is dependent on the heart, and (in a self-confessed metaphor) that the soul is "kindled, as it were," in this place, for just the reason that all vital processes require heart-warmth. *PA* 670^a26 ff. calls the heart "the *akropolis*, as it were," of the body because it is the *archē* of vital warmth.

a central nervous system or its functional analogue—it is in inferring from functional unity to the *singleness* of the relevant organ and assuming without argument that all systems and processes depend in similar ways on the same center. But that is a mistake of another kind, which casts no doubt on the consistency of the *MA* account with the *DA*.

There is, however, one serious and pervasive difficulty about which we have so far been silent. Throughout chapters 6–8, the treatment of desire is persistently obscure. We are never told clearly that it, like the cognitive processes, is necessarily enmattered; far less are we told what its material embodiment is usually like. The result is that a serious doubt does, in fact, arise about the consistency of this theory with hylomorphism. “Desire and the faculty of desire impart motion while being themselves moved” (701^a1): does this mean only what it means in *DA*, that desire is central in activating animals towards their goals, or does it suggest the instrumental picture, in which a non-bodily desire causes bodily change? There is a physiological account given, or suggested, for the cognitive processes; but no provision is made for distinguishing, in physiological terms, between cases where desire is active and cases where it is not. “The animal moves and progresses in virtue of desire or choice, when some alteration has taken place in accordance with sense-perception or *phantasia*” (701^b4–6): does this mean that an enmattered perception gives rise to an enmattered desire, or that the perception triggers a non-bodily activity, which in turn moves the limbs? The final summary, though vague, suggests the instrumental, rather than the hylomorphic, reading:

For the affections suitably prepare the organic parts, desire the affections,¹⁹ and *phantasia* the desire. And *phantasia* comes about either through thinking or through sense-perception.

¹⁹ *Pathē* and *pathēma* are ambiguous, standing now for fears and feelings of confidence (702^a2–3), now for the bodily changes accompanying these (701^b23, cf. *Metaph.* 1022^b15–19), so we cannot be certain where the apparent leap from the psychic to the physical takes place. But the *pathē* here seem most likely to be the heatings and chillings.

Aristotle's “prepares” is extremely vague: it is compatible with the view that an enmattered desire causes, in its turn, new physiological changes. But it must be admitted that the instrumental reading looks easier.

There are several *prima facie* reasons against taking this to be the best reading of the entire *MA* account. First, its oddness as a theory. The Nuyens instrumental view is neat and simple: all psychological processes are non-physical. But here the cognitive processes are clearly enmattered, desire incorporeal. Instead of a Cartesian movement from soul to body, we have the improbable picture of motion from body to soul to body again. But, second, even this reconstruction cannot fit much of the evidence, which claims boldly that the bodily alterations associated with cognition set up an automatic sequence of *bodily* changes leading directly to motion of the limbs. The extended automatic-puppet example, and passages like 702^b21–25 and 701^b24–32, can be understood only on the assumption that the desire that is triggered by perception is also something physical and part of the chain of physiological events. The opening of chapter 8 speaks of a heating or chilling in the heart region connected with the seeing of something *as* something to be pursued or avoided; this must be distinct from the change caused by the mere presentation of the object (cf. chapter 11 and notes), and must indicate the activation of desire. We have, then, a picture in which an *initial* perception is realized in a certain physiological change; but nothing should follow automatically from this (except isolated limb-movements—cf. chapter 11), unless desire is also activated. If desire is activated, a *further* bodily change, a heating or chilling, ensues, from which limb motion follows by a series of automatic steps. The picture is extremely unclear. Aristotle is not careful to distinguish the change that realizes the initial perception from the change following on the activation of desire, from which motion directly follows. But they must be distinct, for not every perception leads to motion; and 701^a4–6 and 701^a33–36 clearly show that the cognitive and the desiderative processes are both necessary in setting up the ensuing motion. Unless the

account is very badly confused, Aristotle does mean to apply the puppet example to the sequence following from the initial cognitive change (cf. 701^b16–18). And this cannot work unless desire, like cognition, has a physiological manifestation, and mediates, physiologically, between the initial cognitive change and the change that (as in 701^b34–35) follows on desiring and leads to motion.²⁰ Not every initial change leads to motion, but everything that *does* follow the initial change is physical and occurs smoothly and swiftly because of the body's own nature. What we seem to need, then, is a bodily process in which desire is realized, that will be moved by initial perceptual changes and, in turn, set up the changes in the heart region that lead directly to motion.

The introduction of *pneuma* in chapter 10 seems to offer what is needed, acknowledging explicitly the deficiency of the earlier account:

According to the account that gives the reason for motion, desire is the middle, which imparts motion being moved. But in living bodies there must be some body of this kind (703^a4–6).

This account reminds us that there are two *logoi*—a teleological one that gives the reasons for motion and a contingent physiological one that tells us (given that there must be *some* body in which desire is realized) what the body usually is. Desire is an enmattered process, and we want to find out what the bodily “moved mover” is; we need an organ, or some stuff, that is capable of receiving perceptual stimuli and initiating bodily responses. The mysterious *pneuma* is invoked to fill this gap.²¹

²⁰ It is worth mentioning that *akolouthēi* is ambiguous between “accompany” and “follow”; therefore 701^b34–35 could be saying either that the heating and chilling *follow* some change that realizes the activity of desire, or that they *accompany* the perception or thought of the object as an object of pursuit or avoidance—which, unlike the initial perception, must follow the activity of desire. It makes little difference which reading we choose.

²¹ Note that *pneuma* responds to qualitative change and causes it in turn, without itself undergoing such change (703^a25)—thus supporting Aristotle's frequent claim that local motion is in all respects prior to alteration (cf. chapter 5 and notes and *Ph.* 260^b7 ff.).

Commentators are divided concerning the place at which *pneuma* enters into the physiological account. Some argue that it sets up the alterations in the heart region that are mentioned in 701^b34–35; others hold that it intervenes between alteration and the locomotion of the limbs.²² Both are, in a sense, correct—for Aristotle does not clearly distinguish perceptual alterations from those that lead directly to limb motion. The former are followed, the latter preceded, by *pneuma*'s operations. It certainly cannot follow the final alteration. It is said to operate around the heart—not to circulate between the heart and the limbs.²³ It is the sinews that are said to be analogous to the puppet strings, not the *pneuma*. If the heating and chilling are followed automatically by expansion and contraction, there will be no need of an extra element here.

A second question is, with what sort of desire is this *pneuma*-activity associated? With a general desire, corresponding to the major premise of a practical syllogism? Or with a concrete desire for something already perceived as accessible? The latter seems more likely, since motion is to follow immediately, and since Aristotle several times indicates that the desire he is interested in follows the initial perception.

The theory of *pneuma* remains obscure. We can see why Aristotle wants to insist that there is some material realization

²² The first position is held by Buridan (see notes to chapter 5) and Peck (*GA*, 578); the second by Albertus Magnus, Farquharson, and Siwek (147).

²³ Because this is inferred from the preceding statement (*touto . . . pros to akinēton*, 703^a11–14), the analogy cannot be used to help the Farquharson-Siwek position. Rather than suggesting that the *pneuma* is a moved mover set in motion by some “unmoved” *archē* in the heart, it stresses only the geographical inseparability of *pneuma* from the heart area. The moving and the unmoved points in the joints are inseparable in place, though their functions differ (cf. *DA* III.10, 433^b24–25, and the analogous use of “potentially one, many in activity” at *MA* 702^a30, 702^b25–26, 702^b30–31). The inference goes: the *pneuma* is as inseparable locally from the central *archē* as the moved “point” in a joint is from the unmoved. Therefore, since the *archē* is in the region of the heart or its analogue, the *pneuma* must be there too.

of desire, but it is not yet clear why he wishes to point to this particular stuff. Why is it impossible to solve the problem within the confines of the usual theory of matter, making use of the animal's physiology as the treatise has already characterized it? Why must the "body of this sort" be an extra body?

THE *PNEUMA* AND ARISTOTLE'S THEORY OF MATTER

Aristotle's theory of matter holds that there are in the sublunary world four elements, each with a rectilinear natural motion. Fire and air always tend to move up, water and earth to move down, until their natural places are reached. This theory poses grave problems for the explanation of how an organic body retains its unity. Only the heavenly bodies, made out of a perfect kind of matter whose natural motion is the same as their own purposive motion, seem to have solved that problem effectively: because their bodily nature is perfect, they are able to move eternally as desire urges.

We must concede that animal bodies are, on any theory of matter, less perfectly integrated, more subject to sickness, disintegration, and death, than Aristotle's divinities. "The movement of the eternally moved by the eternal mover is in one respect similar to that of any animal, but in another respect dissimilar: hence the first are moved eternally, but the movement of animals has a limit" (*MA* 700^b30). But the rectilinear natural motion theory cannot account even for the defective and limited organization of mortal animals. Aristotle's earliest solution to the problem of organic unity is to suggest that the recalcitrant parts, which would tend, without constraint, to fly off here and there, are held together by constraint imposed by soul. In *DC* II.1, he describes the effort exerted by mortal souls in keeping the body together, and denies that such a picture could apply to the perfect natural motion of the heavens. Decay and disability occur in animals when the elements break loose from this soul-constraint and seek their natural places (II.6, 288^b12 ff.). The explanation of animals' organic unity and their

relative success at goal-directed motion seems, then, to require a dualistic theory of soul and body—while the heavenly spheres, on the other hand, admit from the first a hylomorphic account.²⁴

But if Aristotle rejects, as he later does, the apparent dualism of this early work, he must make some revisions in his theory of matter. In *Ph.* VIII.4, he broaches the question again, without speaking of soul-constraint or non-physical substance. At 254^b17 ff., we read that the animal as a whole moves itself naturally; but this is not to say that the various constituents of its body are not moved both naturally and unnaturally. All this, Aristotle says, depends on what the movement is, and what is the element in question. What we need, according to this passage, is some explanation of how the body is able to function as an organic unity, though composed of various elements not in their natural places. Aristotle must assimilate his account of animals more closely to the account of the heavenly spheres, showing how their bodily nature is, without the aid of incorporeal substance, suited for at least some degree of purposive motion. We are reminded of the important passage in the *GA* that suggests that the *sumphuton pneuma*—or rather the vital heat in it²⁵—plays a central role in transmitting sensitive soul to the embryo because the *pneuma* is, in some way, like the element of which the stars are made:

Now the capability of every kind of soul seems to be associated with a body different from and more divine than the so-called elements; and as the souls differ from each other in value and lack of value, so too this sort of nature differs For within the seed of everything there is present that which makes the seeds to be fertile, the so-called hot. This is not fire or that sort of capability, but the *pneuma* enclosed within the seed and within the foamy part, and

²⁴ On the spheres as living, cf. Essay 2, and notes to chapter 3.

²⁵ This distinction is not made in the *MA*, presumably because it is not required for the treatment of this particular problem.

more precisely the nature in the *pneuma*, being analogous to the element of the stars (736^b30 ff.).²⁶

This is the only passage in which the *pneuma* is explicitly compared to the *aithēr*; but this passage suggests that other life-functions, too, must be explained with reference to an element more divine than the usual four. Aristotle's use of *pneuma* elsewhere is very unsystematic, and he nowhere offers a lengthy account.²⁷ It differentiates the parts of the embryo (*GA* 741^b37 ff.) and it fills the passages of certain sense-organs (744^a3, 781^a24 ff.). Its overall importance for him, at some period in his career at least, can be seen in the remark at *GA* 789^b8 ff. that nature effects almost everything using *pneuma* as a tool: it is as versatile in living beings as the anvil or hammer are in bronze-work.

I suggest that in chapter 10 the divine *pneuma* is being applied to the resolution of the dilemma of purposive motion. We have argued that it is the stuff in which desire-activity is realized. Now we see that it is also needed to provide a non-dualistic answer to the problem of describing how the body holds together. The earlier chapters of the *MA* made no mention of the theory of natural motions or of the need for a bodily element more flexible than the others. Chapter 10, however, spends some time in a discussion of natural motion and of the interaction of *pneuma* with fiery and earthy bodies. The simple

²⁶ The translation is Balme's, except that for his "now the capability of all soul," I have preferred "Now the capability of every kind of soul" (cf. Peck, Platt). The relation of this passage to its context in the *GA* has been analyzed by Solmsen in "The vital heat." For an interesting recent treatment of this and related problems in Aristotle's embryology, see Preus, "Science and Philosophy."

²⁷ Good concise summaries of the evidence are in Balme, *PA-GA*, 158–65, and Peck, *GA*, Appendix B (see also his "The connate pneuma"). Still useful is Beare's *Greek Theories*, 333 ff. Jaeger's "Pneuma" remains valuable for its careful demonstration of the *pneuma*'s importance for Aristotle's account of all animals, not just those that do not have respiration. More remarks along these lines are made by Ross, *PN*, 40–43. Rüsche's *Blut*, 188–250, and Lesky's *Die Zeugungslehren*, 128–59 contain useful discussions of the relation between *pneuma* and the vital heat.

elements were said in *Physics* VIII to have only a passive, not an active, power of imparting motion.²⁸ Now Aristotle remarks, "That which is moved but does not naturally impart movement can suffer according to another's power, but that which imparts movement must necessarily have some power and strength" (703^a6–9). The four elements that compose the limbs are being contrasted with *pneuma*, which provides creatures with their *ischus* (703^a9–10, 18–19)—since without this special component animals would, apparently, be unable to go after their objects of desire. It contracts and expands without compulsion (703^a22) and without undergoing qualitative change—a feat of which none of the other elements would be capable. It unifies the animal by offering a counterbalance to the tendencies of the elemental parts, having weight by comparison with the fiery and lightness by comparison with its opposite (703^a23–24). Aristotle concludes by insisting that only a special kind of stuff could move the elements without undergoing alteration, since the "natural bodies" engage in a process of reciprocal dominance (25–26), overcoming each other and (as we learn elsewhere) changing into each other. The city analogy follows—and not by chance, for only with *pneuma*'s introduction has the exposition of the necessary conditions for city-like order been completed. The recalcitrant parts can now be seen as working in organic order for the "good" of the whole, without constant constraint.

These claims on behalf of the *pneuma* are impressive. But in the absence of the detailed account of its operations that we suspect Aristotle at some point either wrote or planned, they strike us as a somewhat incredible promotional effort. We are never even told what element this *pneuma* is actually meant to be. Warm air, says the *GA* at 736^a1. And critics such as Balme, Moraux, and Rüsche²⁹ are certainly correct to protest against any facile identification of *pneuma* with *aithēr* on the basis of the

²⁸ Cf. note on 700^a11 ff.

²⁹ Balme, *PA-GA*, 163–64; Moraux, "Quinta Essentia," 1196 ff.; Rüsche, 194; cf. also Cherniss, *Aristotle's Criticism*, 601–2.

GA analogy cited above. But if it is simply air,³⁰ the motion problem will not be solved, since the natural motion of air is a rectilinear motion upward to an intermediate place below that of fire. Air would indeed be heavier than fire, lighter than its opposite, but there is no reason to think it could escape qualitative change, or expand and contract "without constraint." Aristotle is so far from revising his natural motion theory in psychological contexts that he says of soul in the *DA* (406^a27), "If it moves upward, it will be fire, if downward, earth—for these are the motions of these bodies—and the same argument holds for the intermediate elements." Aristotle does not seem to admit the possibility that there might be air in the body that did not move with the natural motion of air. Nor can *pneuma* really be *aithēr*; this would get Aristotle no closer to solving the problems of bodily motion. Even if we could admit that there might be some of the fifth body in the sublunary sphere—and Preus³¹ cites in evidence *DA* 418^b6–10, where a "transparent nature" is said to be present in water and air as it is in the *aithēr*, claiming a parallel with the discussion of spontaneous generation in the *GA*, where *pneuma* is invoked—even if this possibility could be established, circular motion would not seem to be any more helpful than rectilinear in the *MA* argument, although the *aithēr* would at least be naturally exempt from qualitative change. But in view of Aristotle's proof that there are these five elements and no more, what possibility is open? Reiche's claim for a special mixture of the four elements rests on too many dubious historical arguments to seem at all plausible.³² We can only say that *pneuma* is, apparently, air with a special kind of heat in it that makes it behave unlike ordinary air, more like a different element. But the reasons for

³⁰ The view, as well, of J. Skemp, *The Theory of Motion*, 91–92, of Solmsen, "Greek Philosophy," 177; and, apparently, of Wiersma, "Die ar. Lehre," 102–7.

³¹ Preus, "Science and Philosophy."

³² Reiche, *Empedocles' Mixture*, particularly 83–100. For devastating criticism of Reiche's general plan, see especially the review by Solmsen, *AJP*; also those by Kerferd and Wiersma.

its exemption from the cyclical strife of the elements remain unclear. These are complex questions to which the brevity and simplicity of Aristotle's sketch offer no hope of a satisfactory answer. We had better regard the theory as one in the course of development³³ and *pneuma* as a hypothetical gap-filler whose workings cannot be scrutinized too closely. We frequently wish that Aristotle had a better notion of what sort of work he would have to do to establish the adequacy of a physiological theory—in this case that, rather than presenting us with a non-empirical stuff whose operations are so unclear, he had seen fit to overhaul more thoroughly the theory of natural motions whose limitations made its invention necessary.

The chapter dealing with *pneuma* was used by Nuyens as the best evidence for ascribing a theory of instrumental mechanism to the Aristotle of the *MA*. We see that there is very little in the treatise as a whole that suggests such an account, much more that implies or is at least fully compatible with the hylomorphic theory. The two difficulties in the way of a fully hylomorphic reading of chapters 6–8 are, in fact, removed by chapter 10, which insists that desire is enmattered, showing us what its realization usually is, and which, furthermore, expands the natural motion theory of matter to allow for organic bodily unity without constraint from a non-bodily soul.

If we examine the steps that led Aristotle to his doctrine of *pneuma*, we notice something else of interest. We find that an essential part of the search for the best account of animal physiology was an examination of the goal-directed motions of the heavenly spheres, realized in a uniform and perfect body. At least as a heuristic principle, then, these arguments endorse cross-disciplinary speculation; and we may add the *pneuma* theory to the examples cited in Essay 2 that suggested that Aristotle was adopting a more flexible position on the nature of scientific inquiry. Aristotle indicates in this treatise that the different areas of natural study should not be separated and departmentalized, but must be in constant communication.

³³ As is suggested by Solmsen, "Greek Philosophy," 177, and Balme, *PA-GA*, 164.

Animal motion and heavenly motion must be understood together: on neither subject can we establish our conclusions firmly without a more general inquiry into the articulation of the universe as a whole. With its interdisciplinary arguments, the *MA* shows us that Aristotle, in his mature thought about the sciences, did not view them as separate deductive systems with discrete first principles established by a study of a discrete body of appearances. As in nature it is best that the higher be separated from the lower, but all beings are nonetheless interdependent and ordered together,³⁴ so in science the "higher" disciplines may be marked off from the "lower," but must contribute to each other's progress. And since the "highest" science, cosmology, is the weakest and the most in need of support, the need for cooperation and interdisciplinary study is all the more acute. No inquiry is genuinely separable from a whole group of interlocking studies, and no being can be exhaustively studied without an account of his placement in the whole of nature.

³⁴ Cf. *Metaph.*, 1075^a16 ff. and comments in Essay 1; also *GA* 732^a6

ESSAY 4

PRACTICAL SYLLOGISMS AND
PRACTICAL SCIENCE¹

"Haven't we seen that the appearance leads us astray and throws us into confusion, so that in our actions and our choices of both great things and small we frequently affirm and reject the same things, whereas the science of measurement would have cancelled the effect of the appearance, and by revealing the truth would have brought rest to the soul abiding in the truth, thus saving our life? Considering this, would people agree that our salvation lay in the science of measurement, or in some other science?"

"The science of measurement," he answered.

(Plato, *Protagoras*, 356 d-e,
tr. Guthrie, revised)

So Socrates proclaimed, to the hypothetical "many," his dissatisfaction with the messiness of ordinary attempts at practical reasoning and his hope for a more scientific enterprise that would bring order, even salvation, to troubled men. We have inherited both his discontent and his optimism. The notion that deliberation about how to live might be rendered scientific, and that we might develop a practical *technē*² having the elegance,

¹ I owe a great deal to Wiggins's "Deliberation and Practical Reason," and to Putnam's "Literature, Science, and Reflection." My discussion of practical conflict is greatly (and obviously) indebted to two papers by B. Williams: "Ethical Consistency" and "Consistency and Realism." My analysis of Aristotle's practical syllogisms was very much helped by reading von Wright's discussions of practical inference in "PI," *VG*, and *EU*, and by Malcolm's "Intention and Behavior." I am very grateful to Professor Malcolm for allowing me to discuss his paper here, in advance of its publication, and also to Professor J. Kim for sending it to me.

² Throughout this paper, I shall generally use "practical" where a modern reader might expect an emphasis on the ethical or, at any rate, some attempt to set off moral from non-moral practical reasoning. Aristotle notoriously (and, I believe, correctly) does not distinguish two different forms of reasoning here and makes deliberation about virtues we

the simplicity, and the precision of the most mature theoretical science of the day—mathematics in Socrates' time, physics in ours—remains an alluring one. Socrates advances two arguments for the importance of such a project. He points first to a universal human need. Practical problems are simply too messy and confusing; to get on at all we need more security than we have, and we can banish paralyzing doubts only by latching onto the truth. We are rational beings; then surely we can, and must, do better than we have with the confusing data of the moral life. Second, he points (here and elsewhere) to a necessity peculiar to the moral philosopher: if he is to justify his existence and his claim to respect among men, he must show that he, like other scientists, is a skilled expert, who can teach men mastery of some important practical questions. If there can be no science of morals, there may be no place for moral philosophy in the city.

Socrates did not get far with this project; he did not even provide the account of human nature and of man's final good that would have had to underlie his promised theory of rational deliberation.³ But (ignoring for now the attempted answer provided in Plato's middle metaphysics) he had at least one distinguished, and more successful, successor. Aristotle, the inventor of the syllogism and of the deductive method in the philosophy of science, brought his formidable acumen to the sphere of practice as well and, with his theory of the practical syllogism, made a promising start towards rendering matters of conduct as precise and as deductively neat as the theoretical sciences. With his analysis of man's essence, he provided the new science with a priori first principles, to be grasped by

would call moral just one part of reflection about how to live. This seems to be the point of Anscombe's assertion that the practical syllogism "as such is not an ethical topic" (*Intention*, 78); but by suggesting in this same section that the syllogism is concerned primarily with instrumental means-end reasoning, she makes its potential connection with the moral virtues more obscure than it need be. (Cf. n. 13 *infra*.)

³ For one good account of these questions, see Irwin, "Recollection and Plato's Moral Theory."

intuition but not subject to rational argument. Below these there spreads (potentially, at least) a closed, consistent hierarchy of rules of practice, covering both the moral and non-moral sides of human life, down to the smallest details: the decision to eat some candy, the need to make a cloak. In any deliberative context, all the agent will need to do, once the science is finished, is to subsume the situation under the relevant rule, plug it into the right place in the hierarchy. These rules may or may not harmonize with his desires (for Aristotle's virtuous man, they most often will); but they are there to be grasped, and statically true, regardless of him and his desires. Aristotle was not satisfied that he had accomplished this aim: he often refers apologetically to the lack of precision in his inquiry. But it was his ultimate goal; he shared the Socratic motivation and had, with the syllogism at his disposal, a much surer sense than Socrates did of how the goal ought to be realized.

Or so one story about Aristotle tells us. It is a story that needs to be rigorously questioned. In this paper I shall examine Aristotle's writings, and especially his accounts of the "practical syllogism," for signs of such a scientific theory of ethics. The theory that has been found in Aristotle, and for which I shall be searching, makes the following basic claims (which I shall later elaborate in more detail):

(1) Content: Practical principles form a closed, consistent deductive system, beginning with a priori first principles concerning the essence or nature of man. These principles are objectively valid, independently of the desires and judgments of human agents.

(2) Justification: An agent, in order to justify his action as rational, must show that it obeys a rule that forms a part of this syllogistic system, and that this is the one rule appropriate to his case. (Since it is to be a consistent system, there should be no incommensurable claims. In every situation there will be one appropriate response, and for every right action only one most appropriate justification.) Once he has located the action correctly in this hierarchy, the task of justification is complete.

In addition, most agents will often use the syllogism as a method of deliberation, deciding what to do by subsuming the case under the appropriate rule. But this is not necessary; the action will still be correct and rational if a suitable justification can be produced after the fact.

A third claim is often associated with these:

(3) Motivation: The rules are there, independently of my desires; and if I am rational I will be moved to act by reason, regardless of conflicting sentiments. This claim, unlike the other two, has seldom been ascribed to Aristotle; nearly everything he says about motivation indicates that desire is always involved, whether reason is or not: reason never motivates except via some desire or other.⁴ But the claim about desire, though frequently associated with deductivism, is independent of it. We might plausibly hold that the deductive system, though objectively there to be apprehended, could not in fact motivate unless it were somehow internalized and effected a similar ordering among the agent's desires. This must be the position taken by those who ascribe the first two theses to Aristotle. And it is these two that will from now on engage our attention.

The desire to establish such a deductive science has been a powerful and pervasive one in philosophy, but perhaps the most striking example of an attempt to associate Aristotle with moral deductivism has been the Aristotelianism of Aquinas and the tradition of Christian exegesis descending from it. In Essay 1 we invoked a modern exponent of this tradition, Maritain,⁵ to show how the *ergon* argument of Book I has been read by deductivists. It is said to provide a priori first principles that will serve as the basis for a deductive moral system. There are norms for human conduct existing objectively in nature—a coherent system of rules established not by man, but, ultimately, by God. The prescriptions of divine law are perfect, and provide the standard for the assessment of all our rules and actions. "All laws, insofar as they partake of right reason, are

⁴ Cf. *DA* III.9–10, *MA* 6–7. For a good analysis of the relevant texts, and a comparison of Aristotle to Hume, cf. Irwin, "Aristotle on Reason."

⁵ Maritain, *The Rights of Man*, 58 ff.

derived from the eternal law."⁶ And all knowledge of moral truth is "a kind of reflection and participation of the eternal law, which is the unchangeable truth."⁷ In Maritain's striking analogy, we are all pianos, which will produce the proper sounds only if tuned to an external and objective standard of pitch. (He is here evidently abstracting from the conventional nature of musical pitch and tuning.) If a piano does not produce the right sounds, it "must be tuned, or discarded as worthless."⁸ The aim of ethical science would be, then, to attain to knowledge of the heavenly first principles and the system of prescriptions following from them—ultimately to complete this system so that it offers a coherent set of rules governing every possible human situation.⁹ The aim of rational life-planning would be to attune oneself to these independently existing norms, so that in action we produce correct and harmonious music. An action would be justified by showing that it was in tune; if a life cannot be so justified, correction (tuning) or damnation (discarding) is in order. This is a picture that, in theological or in secular dress, has often been found in Aristotle. Aquinas certainly seems to understand Aristotle's use of the practical-theoretical parallel as providing the warrant for such a reading; and Ross, though he is less elaborate, clearly agrees with Aquinas that the difference between the natural and the moral sciences lies, for Aristotle, only in the difficulty of getting to first principles, not in the place that rules and deductions play in such a science, once properly worked out.¹⁰ Aristotle's high

⁶ Aquinas, *Summa Theologica*, Qu. 93, Art. 3.

⁷ *Ibid.*, Art. 1.

⁸ Maritain, 61.

⁹ This would be the task of positive law. As Maritain writes, "It is natural law itself which requires that whatever it leaves undetermined shall subsequently be determined." I have here deliberately avoided giving an account of the intricate relationship between the divine and the natural law and of Aquinas's complicated views concerning the mutability of the natural law. I am not claiming that the deductivist position I sketch is a correct exegesis of his position.

¹⁰ Cf. Ross, *Aristotle*, 189 and 221, where virtue is said to consist in obedience to rules.

hopes for the deductive model have, furthermore, encouraged even those who believe Aristotle himself never successfully reduced practice to rule to try to improve on his efforts.

Of a somewhat different attempt to find in Aristotle's theory of deliberation a "science of measurement" I shall have little to say. Prichard claimed that *eudaimonia* is a feeling of pleasure, and that deliberation is for Aristotle a hedonistic calculus, which can only select the best instrumental means to this pre-set end; it can always, in principle, offer us a rational solution, in quantitative terms, to any problem of selection. His arguments have been thoroughly, as well as elegantly, refuted by Austin.¹¹ And the more plausible similar claim that the dominant end, and basis for a utilitarian calculus, is theoretical activity, has been as compellingly assailed by Cooper.¹² The entire notion that Aristotelian deliberation is concerned only with instrumental means to an end, and not also with components of the end, was based on misreading and mistranslation and should by now be buried.¹³ There are, in fact, interesting similarities between utilitarianism and deductivism in their attitude towards practical

¹¹ Prichard, "The Meaning of *Agathon*"; Austin, "*Agathon* and *Eudaimonia*."

¹² Cooper, *Reason and Human Good*. He convincingly argues that Books I-IX develop a consistent picture with which Book X is, on some important points, in serious conflict.

¹³ This claim is frequently made in elucidation of Aristotle's statements that deliberation and *prohairesis* are not of the end, which is the object of wish, but only of what is "towards the end" (*EN* 1111^b26, 1112^b11-12, 1134^a35, 1113^a14-15, 1113^b3-4, 1144^a7-8). The phrase *ta pros to telos* is understood by Grant (II, 18) Stewart (I, 262; II, 101), Ross (Trans.), Allan ("Origin," 124), and numerous others to refer only to external means to the end. Joachim argued in *The Nic. Eth.*, 102, equally misleadingly, that *only* components of the end were in question—though the passage he cites in evidence (*Metaph.* 1032^b18-31, cf. *infra*) shows, if read in its entirety, that both components and external means are meant. Greenwood's commentary on *EN* VI tentatively suggested that both means and components might be involved. Wiggins and Cooper both argue convincingly that *ta pros to telos* can cover reasoning about constituents as well as about means. The failure explicitly to distinguish the two in *EN* III is, Wiggins claims, due to Aristotle's attempt "to use the intelligibilities of the clear means-end situation . . . to illuminate the obscurities

conflict and the moral emotions. (This was, so far as I know, first seen by Nietzsche when he called Socrates both a utilitarian and a precursor of Christianity.) Both are optimistic and Socratic about the prospect that an ethical science can remove the messiness from practical deliberation and hence eliminate regret from the life of the man of knowledge. But my focus in this paper will be on the deductivist, rather than the utilitarian, and I shall be asking whether Aristotle's uses of the practical-theoretical parallel, and his doctrine of the practical syllogism, reveal deductivist sympathies.

But what difference would it really make for ethics if the deductive model were introduced as a norm? It is worth pausing briefly to ask whether we are studying a merely theoretical position or one that also has serious implications for practice. The introduction of the deductive model in theoretical science as a schema according to which the scientist can cast his results in epistemologically perspicuous form, thereby supporting his claims to scientific knowledge,¹⁴ seems unlikely to have much effect on the actual research methods of scientists and the rapidity of their progress towards new results. Would an Aristotelian science of ethics also be without practical conse-

of the constituents-to-end case." Aristotle need only be claiming in these passages that all deliberation takes place with reference to some goal. In the context of that piece of reasoning one does not deliberate further about whether to pursue it or not, but may, of course, deliberate about what counts as an adequate description of it, as well as about what external means will help one realize it. For example, 1112^b11 ff. would not be making the absurd claim that one can never deliberate about whether to become a doctor, orator, etc., but the reasonable point that if one is already at work at this sort of activity, one does not continue asking oneself, "Shall I pursue the end?," but rather deliberates about how to fulfill it.

In other works, Aristotle sometimes uses *pros to telos* in a way which more strongly suggests a restriction to means-end reasoning: e.g., *Pol.* 1332^a26 ff., *EE* 1226^b10 ff., 1227^a7 ff. But the very fact that in the *EN* the bare phrase *ta pros to telos* replaces the *ta pros to telos teinonta* or *pheronia* of these earlier works might be seen as evidence of a conscious revision of an earlier doctrine.

¹⁴ Cf. Essay 2 for further discussion of the *APo* project.

quences? Suppose it is argued that the man of practical wisdom acts in accordance with a consistent hierarchy of rules, or at least can justify his actions with reference to such a system. Will that change anything about our actual responses in complex deliberative situations?

I think that it will. In rendering practice scientific, we are, in effect, performing a questionable assimilation of practical claims to beliefs. As scientists, or as people who revere the physical sciences, we believe that the claims of all true beliefs about the world are reconcilable. Everything true must be consistent with everything else that is true. This insight is embodied in the deductive model of the *Posterior Analytics* and is one reason for its attractiveness. Even if the working scientist does not set out his findings in a deductive system, he can always be called upon to do so in order to show that his claims are adequately supported and involve no inconsistency. Even so, the practical scientist might suppose, all claims on us that it is rational to acknowledge are consistent; every legitimate ought is consistent with every other ought.¹⁵ If two beliefs conflict, the scientist assumes that at most one can be correct: he directs his efforts towards discovering which, if either, is, and towards getting rid of the false one. The same might be thought to be true of practical conflict. Suppose it seems to me that I ought to do A and I ought to do B, but cannot do both. Ordinarily, I will be likely to do the one that seemed for some reason better on the whole, but to feel persistent regret that I did not also do the other. I will regard the losing claim as legitimate, and consider that in not satisfying it I did wrong, and that it is rational to acknowledge that I did wrong, even though no better course was open to me. But if I am a devotee of the practical-theoretical parallel, things will be different. Once I have somehow worked out which of the two to do, I will have to regard the losing claim as illegitimate, since it was incompatible with the one I selected. My effort will be to dispose of one of the competing claims, as I might of a false belief, and I will not think it

¹⁵ For elaboration of this and the following points, see the articles by Williams cited in n. 1 above.

rational to have regrets about not satisfying it. (It is easy enough to see why the scientific approach to decision-making would commend itself to a person tormented by practical conflicts as a promise of "salvation." It is also easy to see why both Socrates and Plato, in defense of their optimistic view, had to set themselves against Sophoclean tragedy, with its picture of the fully rational agent as one who neither aims at the avoidance of conflict and regret in planning a life nor feels that the ineliminability of conflict robs choice of its dignity.)

The allure of the scientific picture, especially in times of social upheaval, is attested in a striking example from Tacitus (*Historiae* III.51). A soldier encounters his brother in the battle lines of civil conflict. *Qua* soldier, he ought to kill the enemy; *qua* brother, he ought not to kill a brother. He decides that, all things considered, it is better to kill the man. Let us assume for the sake of argument that this was, on balance, the right decision. He then shows himself to be so free of regret and so willing to dispose of the competing claim that he demands from the generals a reward for his valor. The historian expresses dismay at this modern avoidance of remorse in cases of conflict and recalls a similar case from another era. Here a soldier in Pompey's army killed the brother, but then, in expression of remorse, punished himself by committing suicide.¹⁶ We might say that the "modern" soldier believed he could have neglected no legitimate claim, assuming that he subsumed his action under the appropriate rule. The other was not a genuine ought, and it is rational to behave as though it did not exist. The Pompeian soldier acknowledges the reality and ineliminability of the conflict. If we respond as the historian does to these two cases, we are led to ask whether eliminating conflict and regret is a mark of genuine rationality, and a proper goal for an ethical system. The syllogistic project, if successfully realized, or even if sincerely endorsed as an aim, would have far-reaching consequences for practice itself, and particularly for our emotional responses in cases of serious practical conflict.

¹⁶ For some related reflections, see Walzer, "Political Action."

In the Appendix to Essay 1, I began to dissociate Aristotle from this project by attacking the view that the *ergon* argument of *EN* 1 is designed to provide, via a study of man's essence, some a priori first principles for human conduct on which such a science might be based. I argued that it is, instead, an attempt to clarify dialectically our shared notion of what a human being is, before going on to ask whether there is any picture of the good human life that men interested in giving reasons for their actions could be brought, by reflection and in discourse with each other, to endorse. If Aristotle begins not with a priori first principles, but with a coherent articulation of shared reflections, the deductive enterprise will immediately have a different look. Aristotle will not, apparently, be emulating the Socratic effort to escape from the confusion of appearances to a static and stable truth.¹⁷ (My arguments about his theory of *phantasia* in Essay 5 will indicate that he would not in any case have endorsed the reality-appearance distinction as the *Protagoras* passage draws it.) But the case against a deductive rationalism is incomplete unless we can offer a satisfactory account of Aristotle's use of practical syllogisms, which will dissociate this doctrine from the two deductivist theses. I will now try to offer such an interpretation. This will, initially, take us some distance from the original question, since the practical syllogism is, I believe, an attempt to answer rather different questions.

I shall argue that the practical syllogism is a schema for the teleological explanation of animal activity, designed to show us perspicuously what factors we must mention, what states we must ascribe to the animal, in order to give an adequate explanation of an action. Sometimes the states are conscious, and the explanation corresponds to the agent's actual deliberation; but even when this is not so, the states are supposed to have psychological (and, in most cases, physiological) reality, and to be sufficient conditions for the occurrence of the action. To illu-

¹⁷ I myself do not think that this would be quite the correct view of the *APo* project either and plan to develop this position via an analysis of Aristotle's responses to skeptical attacks on the "appearances". For some preliminary remarks, cf. Essay 2.

strate the completeness of the explanation (or, putting it another way, to show that if these states are really present, action *must* follow), Aristotle tells us that it is like the case of theoretical reasoning: the conclusion follows "of necessity." He further develops the parallel by casting some examples of practical reasoning (or practical explanation) in syllogistic form, notably in cases where he wishes to set out the antecedent conditions for action in such a way as to make clear at what points interference might occur. The practical-theoretical parallel thus does not aim at a deductive system, any more than do the very similar "practical syllogisms" of von Wright, to whose theories I shall often compare Aristotle's. The syllogisms attempt to elucidate the notions involved in the explanation of action and are "scientific" only in that they are in some sense (and we must ask in what sense) conclusive or binding.

This is an account of the use of the parallel throughout most of the *EN* and *EE*, and in the *MA*, chapter 7, where the "theory" receives its fullest development. Slightly more problematic are two passages, in *EN* VII and in *DA* III, where Aristotle, in his eagerness to press the symmetry between practical and theoretical syllogisms, may be thought to characterize the practical examples in a way inconsistent with his general theory. After discussing these passages, I shall return to the original question: what place Aristotle actually does give to rules in his theory of practical reasoning. I shall argue that he not only does not undertake the deductivist task, but also expresses, and gives reasons for, a firm opposition to it.

NECESSITY AND THE PRACTICAL-THEORETICAL PARALLEL

Suppose an animal has a goal G, which is his object of desire. Neither this goal nor his desire for it will lead to action unless he has some belief about how he can go about achieving it. Even if he has a goal G and a belief B that a certain activity that is open to him, A, will bring about G, he may still refrain from

acting, or perform some alternative action A_1 , without surprising us or making us ask, "What prevent him from doing A?" For it might be that A_1 was a faster, or more economical, way of getting G. Or perhaps refraining from acting might have seemed to be a better way of getting G than taking any action at all. But suppose that instead of B the agent had a belief B_1 of the following form: "If G is to be realized, it is necessary for me to do A." In this case, if the agent does not do A, or at least set himself to do A, and was not somehow prevented from doing A or compelled to do something else which precluded his doing A, we will conclude either that he did not really want G, or that he did not really think it necessary to do A in order to attain it. This pattern of practical reasoning, which, after von Wright, I shall call the "anankastic" (because of its inclusion of a premise descriptive of a hypothetical necessity), translates readily into a third-person teleological explanation of the agent's action: "He did A because he wanted G and believed that it was necessary to do A in order to bring it about." This is a complete account of why he did it;¹⁸ and the conditions alleged are sufficient conditions for the action: if action does not follow, we will have to explain why it does not.

The anankastic model can be expanded in two directions. First, we can allow it to include, as a cognitive element, a belief about what would count as realizing G: in other words, a belief about G's constituents, not just about external means to G. "I want to be a good doctor. If I am to be a good doctor, I must always act disinterestedly for my patients' benefit," as well as, "If I am to be a good doctor, I must study anatomy." Deliberation about what counts as an adequate specification of G can thus easily be cast in the same structure used for external means. In fact, there is no reason to regard means-end patterns

¹⁸ Cf. von Wright, "PI" 166, *VG* 168–69, *EU* chapter III. Of course we must explore very carefully the interrelationships of the agent's various desires to make sure we have got the one that is really explanatory, i.e., to eliminate counter-examples of the sort discussed by Kim in "Intention and Practical Inference." I cannot discuss here the complex issues raised in that article.

as any more fundamental than constituents-of-end patterns.¹⁹ Secondly, we can introduce a model for selection among a number of possible means or constituents, which will allow us to cast cases like our first example in the same form as the basic anankastic cases. "If G is to be realized, I must do either A or A_1 ." But by some criterion selected for the occasion—perhaps ease, or rapidity, or its connection with the realization of other goals of the agent— A_1 seems preferable. Now we need only recast the desire statement in the form, e.g.: "I want to realize G as quickly as possible," and the compound belief statement, "If G is to be realized, I must do either A or A_1 , but A_1 will bring G about more rapidly than A," will yield a conclusion as binding as those of our previous examples. I shall argue that Aristotle employs this basic model, expanding its scope in both of the suggested ways: from the first he recognizes deliberation about constituents alongside that about external means; and he briefly suggests a procedure for selection among competing alternatives similar to the one I have outlined.²⁰

As Aristotle often tells us, teleological explanation requires the introduction of a special notion of necessity, the "hypothetical": if a goal is to be reached, certain things must take place or be present. The account of the hypothetical necessity in *Metaph.* V.5 connects it particularly with the teleological explanation of the activities of living creatures:

¹⁹ Cf. n. 13 above. One of the criticisms of the Aristotelian practical syllogism offered by Hintikka ("Practical vs. Theoretical") turns on the assumption, with which I take issue, that "This framework seems to be predicated on the idea that values always enter into it as ends," and that the rest of Aristotle's "deliberative paraphernalia" consists of a hierarchy of instrumental means.

²⁰ Cf. *EN* 1112^b15 ff. and *DA* III.11, 434^a8–10, which will be discussed below. Cf. the model proposed by Mackie in his criticism of Hintikka (109–12). Note that I have proposed introducing the criterion of selection into the desire statement (the major premise); this enables the account to avoid Hintikka's objection (98) that if action is to result immediately upon the actualization of a minor premise, there will be no room in the framework for comparison among several possibilities. For animals, the "principle of selection" might be just the strength of the desire itself.

We call necessary that without which, as a joint-cause, it is not possible to live, as for instance breathing and nourishment are necessary for an animal because it is incapable of existing without them: and anything without which it is not possible for the good to exist or come to be, or for bad to be discarded or got rid of, as for instance drinking medicine is necessary so as not to be ill, and sailing to Aegina so as to get money (1015^a20 ff., tr. Kirwan).

The first remark offers an explanation of why breathing and nourishment are an "objective practical necessity"; it makes no reference to the creature's own beliefs and desires. The second suggests a teleological explanation of behavior following the structure we have outlined, characterizing the situation from the agent's point of view: "I want to be well. If I am to be well, I must drink this medicine."²¹ And if he does not set himself to drink it, we must ask what prevented him or question the sincerity or persistence of his belief and/or desire. Such an explanation, as von Wright observes, would show us how the combination of "the natural necessities" and a man's ends

force upon him the practical necessities of doing things that, for their own sake, he would not do and of forbearing things from which, considerations of ends apart, he would not have abstained.²²

In fact the particular appeal of such explanations for Aristotle may lie in their ability to link an agent's desires and his perceptions of how things are in the world around him, his subjective motivation and the objective limitations of his situation (as he sees them), as the two salient structural features in an account of his action. Indeed these explanations are elucidations of what it *means* to want an end, understand a necessity, initiate action.

²¹ There is an important related distinction also to be found in these examples: a distinction between needs (what members of a certain natural kind must have in order to flourish) and other appetitive states. A further way in which Aristotle's theory of desire differs from the utilitarian's is in its emphasis on this distinction. Cf. Wiggins, "Locke, Butler," 157.

²² Von Wright, VG 176.

The bond is conceptual; we have not fully understood the notions involved if we do not see how they are connected. Suppose I know my friend values money above everything and know that he believes he will lose his year's income unless he sails to Aegina on Tuesday; yet I go to look for him Tuesday in the Piraeus, where he habitually spends Tuesdays. Have I really understood what this wanting and this believing are? Aristotle will say I have not.²³

The model is more fully elaborated in *Metaph.* VII.7, as Aristotle recreates a doctor's deliberation about the health of the patient:

Health comes to be as a result of thinking of the following kind: Since health is *this*, it is necessary, if there is to be health, that *this* be present—for example, balancing of the humors. And if this, then heat. And he goes on thinking in this manner until he arrives at the first thing that he himself is capable of doing (1032^b6–9).

A similar account is given just below, at 1032^b18 ff.; there the activity of warming, which is the first step in the doctor's power towards the end of health, is said either to be a constituent (*meros*) of health or to produce some result that is.²⁴ Aristotle is acknowledging that reasoning about constituents of an important end can be cast in this pattern as well as reasoning about external means.

Aristotle insists repeatedly that these explanations are in some sense conclusive. That is, if the agent really has desires and beliefs of this form, he must of necessity act. If he does not in fact set himself to do what is required, we must either revise our characterization of his states or else offer some further explanation of why he did not act. But what sort of necessity is this, and what is its logical status? Aristotle was evidently puzzled about this, and yet felt called upon to produce *some*

²³ Cf. von Wright, especially VG 171, and Malcolm, "Intention and Behavior."

²⁴ On this passage, cf. n. 13 above.

account of this practical necessity that would make the force of his claims clear. This is not an easy matter, as the efforts of von Wright, with an immensely more sophisticated logical apparatus at his disposal, attest. He is forced to conclude:

We must, I think, accept that practical syllogisms are logically valid pieces of argumentation in their own right. Accepting them means in fact an enlargement of the province of logic. We cannot reduce the practical syllogisms to other patterns of valid inference.²⁵

Aristotle takes a similar course: while insisting that the necessity of his teleological patterns is to be distinguished from theoretical necessity, he claims that the practical examples are logically conclusive in their own way. Without attempting to reduce these to a valid deductive pattern, he employs a parallel between practical and theoretical reason to emphasize their "validity." Now it is very important to him to distinguish the two: for he does not want to grant that an efficient-causal explanation that makes no reference to the agent's goals and intentions could ever provide an entirely satisfactory account of the action (cf. Essays 1 and 3), much as theoretical premises jointly determine a conclusion. He therefore warns us:

The method of demonstration and of necessity is different in the natural and the theoretical sciences. . . . For the starting-point is in one case what is, in the other what will be. For because health, or a man, is such, this must of necessity be or come to be—and not, because this is or has come to be, that of necessity is or will be (*PA* 639^b30 ff.).

In *Ph.* II.9 (200^a15 ff.) he again acknowledges the contrast between mathematical and biological necessity, but reminds us that in both cases the *archē* necessitates the conclusion.²⁶ The

²⁵ Von Wright, *VG* 167–68.

²⁶ There is an interesting discussion of this passage and other aspects of the practical-theoretical parallel in Etheridge's "Aristotle's *Pr. Syll.*" I think, however, that Etheridge distorts the issue by not giving earlier and more prominent recognition to the difference between the two sorts of necessity in question and by not showing us why Aristotle should have preferred a teleological, rather than a syllogistic, explanation for action.

first principles of mathematics necessitate what follows from them, and the goal that is the starting-point in a biological explanation necessitates the steps that are required to attain it. A theoretical major premise, via an appropriate minor, yields a propositional conclusion. A goal, via an appropriate hypothetical necessity, can be seen to yield a result that is a state or process—and, in the case of a goal that is some agent's object of desire (since Aristotle has here been speaking of both functional and intentional explanation), an action. Again, at *EN* 1151^a16–17, Aristotle observes that the *archē* in action is the goal, just as in mathematics the *hypotheses* are *archai*. In *EE* II.11 (1227^b28 ff.), an example similar to those from *Metaph.* VII is introduced by a statement of the practical-theoretical parallel and compared to a deductive inference:

For as in theoretical sciences the assumptions are *archai*, so in those dealing with action the goal is the *archē* and the assumption. Since it is required that so-and-so be healthy, *this* must be provided if the goal is to be realized; just as in the other case if the angles of a triangle add up to two right angles, such-and-such a consequence must necessarily follow.

The goal is called both the starting-point and the "assumption" because for any deliberation there has to be some goal that remains unquestioned within the context of that particular bit of reasoning (cf. n. 13 *supra*).

A similar account of deliberation is given at *EN* 1112^b15 ff. Here Aristotle goes further, suggesting a procedure for expanding the "anankastic" model to cover cases where there is more than one possible way to the desired end:

They assume the end and consider how and through what it will be attained; and if it seems to come about through several means, they consider by which it is most easily and best achieved, while if it is achieved by only one they consider how it will be achieved by this, and through what *this* will be achieved, till they come to the first cause, which in discovery is the last. For the person who deliberates seems to

investigate and analyze in the way described as though he were analyzing a geometrical construction. . .²⁷ and what is last in the analysis seems to be first in coming-to-be. And if they come upon an impossibility, they give up the search—e.g., if there must be money, but it is impossible to procure it. But if it appears possible, they set themselves to do it.

The process described is one of continuous reasoning back from an end to action, including steps that apply some criterion (e.g., ease of accomplishment) towards a selection among various possible routes to the end.²⁸ The parallel with theoretical reasoning is not explicitly invoked, perhaps because the necessity of acting is not being emphasized. But the account is almost identical with those in *Metaph.* VII and *EE* II, and we can imagine the parallel being applied in the same way as in the *EE* example.

Aristotle has invoked the practical-theoretical parallel for a very limited purpose: to suggest that both are equally valid patterns. He has gone so far as to compare the desirability characterization of a bit of practical reasoning with a premise of theoretical reasoning, and he has certainly indicated that his examples of anankastic explanation are worthy to be called patterns of inference with respect to their logical conclusiveness. It is not surprising, then, to find him pushing the parallel a bit further and actually using syllogistic language in the practical sphere:

Syllogisms that deal with acts to be done (*sullogismoi tōn praktōn*) are things that have a starting-point, viz., "Since the end, i.e., the best, is of such and such a sort," whatever it may be (and let it for the sake of argument be what we

²⁷ This example from geometry supports the argument that Aristotle thought we could deliberate about constituents as well as about external means. Breaking up a geometrical figure into its component triangles provides a useful image for the process of analyzing an end of action into its various components.

²⁸ A similar process is described in *DA* 434^a8–10: one chooses a single criterion, according to which one measures the various alternatives. On the role of *phantasia* in this deliberative process, cf. Essay 5.

please). And this is not evident, except to the good man (*EN* 1144^a31 ff.).

Reasoning about practical matters begins with a good or an apparent good as seen by the agent. He reflects, "Since the goal is of such-and-such a sort, it is necessary, if the goal is to be realized, that this be done."²⁹ After setting down something about the nature of the end being held firm for the purpose of this deliberation, he goes on to work out its constituents or the means to it. For any chain of deliberation, then, there must be some end the pursuit of which is not, itself, subject to deliberation. But this end could be the universally desired end of health, or even, it could be argued, the ultimate end, *eudaimonia*—since it does not appear to be completely vacuous, though it is vague, and has at least one formal characteristic, self-sufficiency (*autarkeia*), which could be stated by the agent as its *toionde* before he went on to specify its constituents.³⁰

Much has been made of the use of the word *sullogismos* in this passage. Ando and others seize on this as the central theoretical statement of an architectonic theory of the practical syllogism and proof of the syllogism's centrality in Aristotle's ethical thought.³¹ Hardie observes justly that *sullogismos* has also the non-technical senses "calculation," "inference," and even just "reasoning." Such non-technical uses of *sullogismos* and *sullogizesthai* are common outside Aristotle; a few examples are

²⁹ Hardie (*AET* 249) is disturbed by the presence of the "since" (*epeidē*) and feels that if it is included in the content of the agent's deliberation this tells somehow against the possibility that the passage concerns a chain of reasoning about important goals. It is hard to see the force of this objection. The "since" is just what we would expect as the introduction to some practical reasoning—or, more generally, to an explanation of an action that begins by ascribing certain goals to an animal agent. It is familiar to us from the passages cited from *EE* II.11 and *Metaph.* VII.7, where it is used in the very same way.

³⁰ Cf. B. Williams, "Aristotle on the Good."

³¹ Ando, *Aristotle's Theory*, 232: "No doubt, this statement refers to the major premise of practical syllogism, which is the highest principle of morality. This is the same as the highest principle of rational or calculative imagination discussed in the *DA* (434^a8 ff.)."

found within the *corpus* as well.³² In favor of understanding this as a reference to the technical language of the *Analytics* we might, however, invoke two closely preceding passages. At 1142^b21 ff., also in a discussion of deliberation aiming at the good, Aristotle mentions that it is possible to arrive at the desired end via the wrong middle term; in this case one has employed a "false *sullogismos*." At 1143^b1–3 he refers to the role of *nous* in apprehending the "other premise" (*tēs heteras protaseōs*)—i.e., presumably, the minor premise of a practical syllogism as Aristotle will more explicitly describe it elsewhere. It seems likely that Aristotle is not using *sullogismos* carelessly in 1144^a31 ff., but after having reflected for some time about the implications of the practical-theoretical parallel. The word occurs naturally in a context where this parallel and the question of necessity are of central concern to Aristotle. The passage is best read as an attempt to develop the parallel a step further by making use of the technical language of the theoretical syllogism in explicating practical reasoning and explanations of action. Its aim is to gain theoretical respectability for the "anankastic" explanatory model by giving it a title carrying with it the prestige of the *Organon*.

THE PRACTICAL SYLLOGISM IN THE DE MOTU ANIMALIUM

So far, then, Aristotle has used the practical-theoretical parallel not to construct a deductive science of ethics, but to elucidate certain notions involved in the explanation of action: wanting an end, understanding a natural necessity, setting oneself to act. There is no hint of a system of rule-case deductions, and no evidence of a plan to work towards a grand hierarchical system. The *MA* continues along the same course, clarifying and elaborating Aristotle's parallels.

³² Hardie, *AET* 243. Cf. Herodotus 2.148; Lysias 32.22; Plato *Charm.* 160 d, *Laws* 799 a, *Gorg.* 479 c, 498 e; and many others—cf. Liddell & Scott, s.v.; also Bonitz, s.v., and Bonitz's "Note." In Aristotle: *Metaph.* 1042^a1 ff., *EN* 1101^a34, *Rhet.* 1371^b9, *Po.* 1448^b16, *PA* 656^a27.

"How does it happen that thinking is sometimes followed by action and sometimes not, sometimes by motion and sometimes not?" (701^a7–8) With this very general question Aristotle introduces the account of action in which the practical syllogism will furnish an explanatory model. Having enumerated the various faculties that figure in the explanation of animal motion—species of cognition and of desire—Aristotle must now go on to say how their activities must be combined if action is to follow. The initial question, "Why does cognition sometimes lead to action and sometimes not?" should be understood to demand the answer that the syllogistic examples will provide:³³ because sometimes there are present both a desire for the apprehended goal and a cognitive specification of what must be done if the goal is to be reached, and sometimes not.³⁴

Aristotle now clearly distinguishes the conclusion of a piece of theoretical reasoning from its practical counterpart:

But in that case the end is a speculative proposition (for when one thinks the two premises, one thinks and puts together

³³ Some commentators, following Michael (116, 16–23), understand the opening question to demand the answer, "Because sometimes the thinking is theoretical, in which case a proposition is the conclusion, sometimes practical, in which case one acts." We would then expect Aristotle to introduce a contrast between practical and theoretical reason: "Because different things happen . . ." Actually, he produces a comparison: "It looks as if almost the same thing happens" as in the theoretical case. This is then followed by a contrast between the two conclusions, which is epexegetic of the "almost" (*paraplēsios*); but the force of the parallel is to emphasize the necessity with which, in both cases, the conclusion—of whatever sort—follows from the premises.

³⁴ Note that there is no distinction made here between deliberation arriving at a general conclusion and a subsequent stage in which the conclusion is applied to the here and now. Aristotle does not restrict the scope of the syllogism by asking, "How does it happen that an agent thinking about a general deliberative conclusion sometimes acts and sometimes does not?" In fact he has called *prohairesis* (*qua* dianoetic desire) one of the psychic factors we are to mention in the explanations for which the syllogism offers a model (700^b18). The syllogism is to provide a schema for answering a very general question about the conditions for action, which could be posed at various stages of the deliberative process. About the question of time, cf. *infra*.

the conclusion), whereas here the conclusion that results from the two premises is the action (701^a10-13).

He repeats this claim below at 701^a22-23: "Now that the conclusion is the action is obvious."

The so-called conclusion is, in the practical case, not a proposition at all, but an action. That is, the factors that (for the sake of an illustrative parallel) Aristotle will call premises lead to action, not just to verbalizing or thinking. Action (or refraining from action) is the explanandum; speech is no substitute. Seen this way, Aristotle's statements, which have rarely been taken literally,³⁵ make good sense and do important work in establishing his picture of practical necessity. Of course a human agent might verbalize his conclusion; he might express his desire and his belief in words as well. But this will not in any important respect alter our account of his behavior. If he says, "I must build a house," but does not set himself to do it, we cannot admit that he has "drawn the conclusion;" we will, as in the case where he neither verbalizes nor acts, have to question the sincerity of his want and/or belief or look for a preventing factor. The theoretical syllogism is essentially linguistic; to the theory of the practical syllogism language is of minor importance. As von Wright observes:

It is of the essence of propositions that they are expressed by sentences. . . . Wants, states of knowing or believing, and acts have no analogous connection with language.³⁶

At 701^a33-34 Aristotle speaks figuratively of the faculties "saying" the premises, indicating again that literal verbalization is not a central feature of his scheme. (Nor could it be, if it is a model to help us explain the activities of all animals.)

³⁵ Burley was, as far as I know, the first not to take them literally. Since then most critics have agreed with him that Aristotle must really be talking about a proposition. Contemporary exceptions are Cooper, Anscombe (*Intention*, 60-61), Wiggins. Santas ("Aristotle on Practical Inference") initially criticizes Aristotle's statements about the conclusion, but then endorses something very like this account (177).

³⁶ Von Wright, "PI" 168-89.

All this is a very odd way of talking about the conclusion to a syllogism. But the practical syllogism is, after all, only a piece of formal apparatus that we invoke to explain what is supposed to be going on psychologically, and what faculties we must mention in accounting for the animal's behavior. If the analogy to the syllogism shows signs of strain, it, rather than the complexities of the *phainomena* of action, should be sacrificed.

We must pause here to ask just what Aristotle has been telling us about the relationship between conclusion and premises. Do they really somehow *entail* the conclusion, or is the relationship a slightly weaker one: the truth of the premises does not exactly entail the conclusion, but simply makes its failure to occur *inexplicable*?³⁷ That is, if action does not follow, must we conclude that the premises were false (the agent did not have the desire and/or belief we thought), or is there still room to grant their truth, but to conclude that the failure to act is mysterious, incomprehensible? Aristotle's treatment nowhere suggests the second alternative; in fact, he repeatedly stresses that the relationship is one of entailment. At the conclusion of the following section, I shall examine Malcolm's argument for

³⁷ Von Wright's position here appears confused. He believes that the full claim of entailment would be "dogmatism": if no action does, in fact, follow, we should not have to conclude that the premises were false (*EU*, 116-17). But he does hold that if the action "is already there and a practical argument is constructed to explain or justify it" we *do* have a logically conclusive argument. The necessity is "*ex post actu*." But his arguments for this asymmetry do not appear convincing. Malcolm, agreeing with von Wright that to claim logical entailment would amount to dogmatism, proposes a more plausible view. If the premises are true (either in the case where there is already an explanandum or in the pre-action case) it is unintelligible that the conclusion should be false: unintelligible not in the sense that its truth is therefore necessary, but unintelligible in the weaker sense that it would be impossible to *understand* its falsity or offer an explanation for it. To eliminate every possibility of explaining the falsity is not to show that there is, in fact, an entailment, Malcolm argues—although the logical connection is so strong that we are inclined to feel that there really is an entailment, and we may say that there is a "quasi-entailment." I shall suggest below that Aristotle would not accept even this move: for him, Malcolm's two senses of "unintelligible" are not really distinct.

the second course, suggest some reasons why Aristotle (unlike Malcolm and von Wright) holds to the stronger claim, and ask whether, as these two writers charge, such an approach is indeed "dogmatic" and misleading.

The relationship between premises and conclusion is, as we have already said, a conceptual and logical one: the aim of the discussion is to elucidate the logical relationships among the concepts of desire, belief, and action. It is part of what it *means* to want an end that one takes action towards it in certain circumstances; it is of the nature of action that it is determined by a desire and a belief.³⁸ But, given this close conceptual connection, one wonders whether it still remains possible to identify the desire and the belief independently of the action to be explained. Does Aristotle leave us any way of isolating the explanatory factors from the explanandum? It emerges clearly from the subsequent sections of *MA* 7–8 that he believes he does. Desires and beliefs are, in the practical syllogism itself, not Humean causes: they cannot be independently picked out. And yet, under another description, Aristotle believes they *are* causes: each of them can also be described as some physiological change, and these changes *cause* the motion, just as the puppeteer's initial loosening of a string can be said to cause the sequence of ensuing motions (701^b1 ff.). Of course in most particular cases the appropriate physiological description for a complicated desire or belief will not be available to us. Aristotle never, I believe, even claims that the two descriptions are related in any constant or predictable fashion. Token-relations like these are not going to be of much use to the scientist, and could certainly not be used to test his explanatory theory. In some cases, e.g., desire (cf. Essay 3), it seems to be simply an article of faith with Aristotle, for which he has no evidential support, that there *is* such a physiological description. But that

³⁸ Cf. Malcolm, here in agreement with von Wright: "There is a deep relation of meaning between sentences of the form, 'He intends to do A,' and sentences of the form, 'He will do A.' This relation is 'conceptual' (pertaining to how we think and act) and also 'logical' (pertaining to the 'logical grammar' of the language in which we think). The strength of this relation is illuminatingly revealed in the practical syllogism."

he wants to assert both a causal and a conceptual relationship among desire, belief, and action, and along what lines he tries to do this, should be evident from the *MA*'s double account.

To make the point of using syllogistic examples more perspicuous, Aristotle now goes on to give us an account of the major and minor "premises." "And as for the premises of action, they are of two kinds—pertaining to 'the good,' and pertaining to 'the possible' (701^a24–25).³⁹ Allan has claimed that this is a distinction between two sorts of major premises: the premise of the good is the first premise of a rule-case syllogism, and the premise of the possible the major premise of a means-end syllogism.⁴⁰ The passage cannot bear this interpretation. Context indicates that Aristotle, having once again told us his position on the nature of the practical conclusion in *all* these examples (701^a22–23), is going on to make a correspondingly general remark about the nature of the premises. Allan implies that there can be a practical syllogism concerned only with naming a good, without any specification of how it is possible to realize that good, and that, on the other hand, there can be practical reasoning issuing in action that begins with a mere naming of a possibility. But the "walk" example, which Allan cites as

³⁹ Too many commentators fail to observe that the *MA* introduces a new theoretical distinction, claiming that Aristotle always holds to the *katholou/kath' hekaston* structure: cf. Anscombe, "Thought and Action," 151, Grant I, 263, 268; Joachim, 210; Gauthier-Jolif, II 2, 601; Greenwood, 50 ff.; Kenny, "The Practical Syllogism," 170 ff. An honorable exception is Santas, who observes (167) that "An inspection of the examples also reveals that the premise 'of the good' is not necessarily the same as the 'universal premise', nor the premise 'of the possible' the 'particular premise'." Ironically, even von Wright claims ("PI" 159) that Aristotle "seems throughout to be thinking in terms of the subsumption of an individual act under a general rule of action by the intermediacy of a particular fact-stating premise."

⁴⁰ Allan, "Pr. Syll.," 330–31. Cf. also Walsh, 131 ff. Both Buridan and Michael share our view of the relevance of the *agathon-dunaton* distinction. See also Hardie, *AET* 247–48, for a critique of Allan's view. Hintikka (97 and n. 15) remarks that it is necessary to understand the two premises mentioned as the major and minor of a single syllogism if we are to make sense of the following argument about suppression of one premise: "For this purpose, he needs precisely the distinction between the major and the minor premise, not any old distinction between different types of premises."

exemplary of a syllogism of the good, has a minor premise ("he is a man") that indicates that it is *possible* for him to realize the major; and the "cloak" example begins with the statement of a desire for covering and aims, as much as any of the other examples, at some good for the agent. We should understand Aristotle to be distinguishing two sorts of premises in a single syllogism: there is the major, which mentions the object as desirable, and the minor, which pertains to the particular situation and shows how it is possible for the desired goal to be attained.⁴¹ To judge from the "drink" example (701^a32-33), the first is "said" by some sort of desire, the second by a cognitive faculty. In chapter 6, Aristotle enumerated the faculties that play a role in animal motion, and claimed that they are all species either of cognition or of desire. To this division there now corresponds a division of premises in the "practical syllogism." To have action we must have an end characterized as desirable and a specification, provided by a cognitive faculty, of how it can be realized.

The practical syllogism, thus conceived, becomes a model in the service of Aristotle's theory of reasoning back from a desired goal to the first action necessary for its achievement that is in our power—or of explaining action towards the goal even when such reasoning is not explicit. The two premises correspond to what we saw were the two major elements in an anankastic explanation: the desire for the goal, and a belief to the effect that if the goal is to be realized such-and-such must be done. Sometimes the such-and-such will need further deliberative work; the chain will continue until the agent reaches a minor premise that is in his power. At this point, if both "premises" are present, the agent acts "unless something prevents or compels him" (701^a16).⁴² Most of these premises "of the possible"

⁴¹ Cf. Wiggins, "Deliberation," 39-40; Anscombe, *Intention*, 62 ff.

⁴² For Aristotelian parallels, cf. commentary *ad loc.* Von Wright accepts as preventing factors only events in the "outer world" that make it physically impossible for the agent to do the required thing at the required time (*EU* 106); but he later cites forgetting as another possible interfering factor alongside prevention narrowly conceived. Cf. note on 700^b17-23.

are, of course, looser than the second element of a strict anankastic explanation would be. Only the second half of the cloak example (the example that is, in any case, the most fully elaborated) has the conclusiveness of the examples from *EE* II and *Metaph.* VII. But we have indicated how they could easily be converted to a form in which action would necessarily result, with the aid of some criterion for selection among possible alternatives. *EN* 1112^b15 (cf. *supra*) made such a selection process part of reasoning about an end; and *DA* III.11 (434^a8 ff.) elaborates it, speaking of measuring alternatives by a single criterion in order to maximize some value. Aristotle would probably say that if we make the contents of the major premise precise enough, we will always get an action as conclusion via some one appropriate minor premise. If his examples are not filled in in this much detail (and nothing less would count as an adequate explanation of an action), it is because he is here more interested in claiming that we need some combination of cognition and desire than in showing just how our goal must be specified before we take action towards it.

This is not, however, the full extent of the problem. For there really seem to be two logically distinct cognitive activities that Aristotle somewhat misleadingly subsumes under the general rubric of the "minor premise," or the premise "pertaining to the possible." First, the belief about what must be done if the goal is to be realized. Second, the perception that one can do that act now.⁴³ A calculation of the first sort ("If I am to get a cloak, there must be this") might be completed before the time when action is possible. "If I am to get that job, I must go to the interview tomorrow at 11 A.M." The conclusion is still action, but one acts only when the appropriate time arrives, and only if one's desire and belief are still fully active when that time

⁴³ Von Wright (*EU* 103) includes this second cognitive element "in a concealed form" in the major or desiderative premise: the agent thinks he knows how to attain the object of his intention. Malcolm more perspicuously adds a third premise: "R was able (to do X)," and also includes here the specification of absence of prevention.

comes.⁴⁴ To take account of this, Aristotle might either add an extra minor premise ("Now it's 11:00") or he might just say that the conclusion is the action of going to the interview at 11 A.M. the next day. In the latter case, the perception "Now's the time to act," either would not figure in the syllogism at all

⁴⁴ Von Wright expresses this by writing as his final formulation (EU 107):

From now on A intends to bring about *p* at time *t*.
 From now on A considers that, unless he does *a* no later than at time *t'*, he cannot bring about *p* at time *t*.
 Therefore, no later than when he thinks *t'* has arrived,
 A sets himself to do *a*, unless he forgets about the time or is prevented.

Cooper's formulation of the practical syllogism, which makes the syllogism concerned only with the application of a general resolve at a particular time, was published too recently for me to make discussion of its thesis a central structural feature of my argument. My differences with this section of his book (which is undoubtedly a major contribution to Aristotelian studies and which contains many powerful and compelling arguments) will be plain from my discussion, here and elsewhere. Here, briefly, are a few of the points on which I would take issue with Cooper were I to write a full-length discussion of his account:

(1) His analysis fails to give an adequate account of the *MA*'s theoretical distinction of premises or of its examples—at least two of which do not include any particular premise pertaining to the here and now (cf. pp. 343 ff.). Cooper evidently believes the *EN* discussion of the syllogism is the primary source for Aristotle's theory and hence that we have reason to separate Aristotle's theory of the syllogism from his general account of deliberation, even though such a separation cannot be read into the *MA* account (cf. n. 34 above.) But the *MA*, unlike the *EN*, *claims* to be providing a general theory of explanation and to be using the syllogism to this end; the *EN* (cf. pp. 201–205) shows us only how practical syllogisms might be used in some rather special cases.

(2) A related point: Cooper's distinction could not be applied to non-human animals—and yet he offers no argument that *MA* 7 is about human action only.

(3) Cooper gives us no reason to suppose that the distinction between resolve and application—in those cases where there is one—could not be handled in the way that I have (following von Wright) suggested or that his account fits the *MA* evidence better than this one.

or would be conflated with the conclusion: the agent acts when (he thinks that) the appropriate time has arrived. We will see whether he really continues to want that job and to believe that in order to get it he must go to the interview, only when we see whether he turns up at the Harvard suite at the appointed time—if, that is, he is not prevented (e.g., by another university). If he does not realize that it is 11:00—if, for example, his watch has broken (so that we have no reason to doubt the sincerity of his desire and/or belief), we would probably admit this as an external preventing factor. But part of drawing the conclusion (acting on the desire and the belief) will be taking all the steps we would ordinarily think necessary to ascertain that the appropriate time has come. If he does not take these steps, we will call the syllogism incomplete not just because of the immediate failure to note the time, but in a more fundamental way: he did not really have the major and minor premises we thought he did. We will not often accept forgetting as an external preventing factor (unless, of course, it is externally induced, as by a drug he is given without his knowledge); we will be tempted to say he would not have forgotten if he had *really* wanted what we thought he wanted.

These complexities are of very little concern to the analysis of *animal* motion, where there is rarely, if ever (in Aristotle's opinion), a distinction to be made between resolve and application. Animals simply follow the appearance of the moment (*EN* 1147^b3–5, *Metaph.* 980^b25–7). For this reason, and, furthermore, because it is the desire and belief *at the time of acting*, and not at any prior time, that are really needed to explain the action, Aristotle typically considers only cases where the time to act is now. He therefore never clearly distinguishes the premise of hypothetical necessity, which analyzes the possibilities open to the agent, from the premise of here-and-now possibility, which recognizes in the situation before the agent a feature relevant to his goal. I do not believe this omission seriously damages the *MA* account, especially as a very general story about the adequate explanation of all animal activity. If it shows anything, it shows the limitations of the theoretical syl-

logism's two-premise structure for the analysis of complex human cases.

Now we must look briefly at the *MA*'s heterogeneous examples. For even if Allan is wrong about the sense of the theoretical premise-distinctions, the examples might support his theory rather than Aristotle's. As it turns out, however, though all are sketchy and two pose more substantial problems, they provide a nice spectrum of cases, consistent with the general account we have worked out; and they even point usefully to a legitimate place for rules within the non-rule-based theory of practical reasoning.

At the center of his account is the second part of the "cloak" example, clearly anankastic in form: "If there is to be a cloak, there must necessarily be this first; and if this, this. And this he does at once" (701^a21-22). (The cloak was already said, in the first half of the syllogism, to be needed by the agent.) Into this same general pattern we can easily fit three other syllogisms, if we allow for Aristotle's silence about a procedure for selection among alternative possibilities. (1) The "house" syllogism: "I should make something good; a house is something good. At once he makes a house" (701^a16-17). (2) The "drink" syllogism: "'I have to drink,' says appetite. 'Here's drink,' says sense-perception or *phantasia* or thought. At once he drinks" (701^a32-33). (Note that this is the *only MA* example containing a genuine deictic reference to some aspect of the agent's situation in the minor premise—cf. fn. 44.) (3) The first part of the "cloak" syllogism: "I need covering; a cloak is a covering. I need a cloak. What I need, I have to make; I need a cloak; I have to make a cloak" (701^a17-19). Here the agent, not having reached what it is in his power to do, states the conclusion in propositional form. But Aristotle is at pains to assure us immediately that "the conclusion, the 'I have to make a cloak,' is an action" (701^a19-20). Aristotle seems to be saying here what von Wright does when he describes the agent as "setting himself" to do the action: from now on, he will take whatever steps are in his power towards its realization. What is important is not the propositional conclusion, but that the agent embarks

on the activity of cloak-making—an activity that may, of course, include further deliberative steps.⁴⁵

The syllogisms most difficult to fit into the overall pattern of the *MA* explanation are the two with which the series opens, the "walk" pair:

(1) When someone thinks that every man should take walks, and that he is a man, at once he takes a walk (701^a13-14).

(2) If he thinks that no man should take a walk now, and that he is a man, at once he remains at rest (701^a14-15).

Two features of this syllogistic pair immediately strike us: (1) the oddness of the minor premise, "He is a man," and (2) their apparently different form: they are deductively valid. The choice of the minor premise strikes us as a mistake on Aristotle's part. Serious reflection about one's good presupposes, as we have seen (in Essay 1), an awareness of oneself as a certain sort of being; an attempt to articulate our shared conception of human nature is basic to the job of specifying the components of the good life. But these examples show the agent endorsing a rule as good for all human beings and then having to remind himself that he *is* a human being, and that the rules apply to him. I think of some man-rules and some ape-rules. (It is hard to know how I arrive at these without drawing on my moral intuitions *as* a certain sort of creature.) I then ask, "Am I a man or an ape in fact? Which rules do I take as governing my conduct?" I am a smiling biped; I appear to be rational (though this bit of deliberation would make most of us doubt this); I must be a man. So I take a walk instead of swinging through the trees. The premise "I am a man" will really make sense only in a case in which there is a genuine doubt, hence not in any ordinary case of practical rea-

⁴⁵ Santas (175-77) objects that the conclusion cannot be the action because the occasion to act may never arise. But this would not cause Aristotle serious difficulty: he will just say that the man's premise of the possible was mistaken. The agent may sincerely make a prediction that events fail to bear out. But this means the "syllogism" no longer stands up, and he is not bound to act. To avoid problems about prediction and statements about the future, Aristotle's analysis usually confines itself to cases where the time to act is now. But we should not infer that his model could not handle more complex cases.

soning. Aristotle seems to show discomfort with his own examples in the following paragraph, where he remarks that if the minor premise is an obvious one, one does not "stop" for it. "For example, if taking walks is good for a man, it (sc. reason) does not waste time considering that one is a man" (701^a26-28). But the qualification comes too late and is insufficient.

One might try to make some sense out of this example-type by making the relevant considerations more specific. "Courage requires this now; I am a courageous man," etc. But this is little better. Reflection about one's actual character does not seem to enter in this odd way into the content of our deliberation.⁴⁶ There are, however, some cases, those in which self-inquiry or self-discovery is actually taking place, which might appropriately be given such an analysis. I know a certain exercise is good for people with muscular strain of the lower back. I then rule out alternative explanations of my pain and ascertain that this is in fact my case. I do the exercise. Here the second step would involve my learning something relevant about myself that I had not known before. Or take a more complex moral case. I might come to see something new about my character (e.g., by noting my response in some new situation) and, in consequence, apply to myself some reflections that I had previously formulated in a purely abstract way. I have always thought jealousy to be an undesirable human emotion; but I have never thought I had to worry about this myself. But now I discover jealousy in myself and realize that I shall have to apply my general principle to my own case.

But these cases of self-discovery, which do, without absurdity, involve minor premises of the "I am a man" type, qualify only dubiously as practical syllogisms. The major premise ought to point to some actual desire of the agent's. Aristotle would not, I think, concede that in our two cases there *was* a genuine major premise before the agent's *own* desires and goals became involved. As long as we reflect abstractly on practical matters,

⁴⁶ There are some interesting remarks about this question in B. Williams' "Utilitarianism and Moral Self-Indulgence," forthcoming, draft pp. 12-13.

the reasoning is not, in the Aristotelian sense, practical. The exercise would be characterized as desirable (i.e., give rise to a major premise) only if I have seen its usefulness for me; before that, desire and the practical syllogism would not be involved. The second example is more problematic: the problem of jealousy did arise in the course of reflections on what constitutes the good life for a man. In some vague way I did have a desire that I avoid jealousy. Insofar as the reflection about jealousy is purely abstract and unconnected with deliberation about my own good, it is not a major premise of action. Insofar as I apply it (even if remotely and potentially) to my own case, it is a genuine premise, and, we notice, the example will then fit very well into the general explanatory scheme already outlined. I want to avoid jealousy. If I am to avoid jealousy, I must not behave this way in this particular situation. And he alters his behavior, unless something prevents him. (Contrast the ill fit of the bizarre "walk" example: All men should take walks. If I am to be a man taking a walk, I must be a man, but I *am* a man, so I go walking.)

This leads us to the more basic problem about these syllogisms and their relationship to the general account: their rule-case structure and apparently straightforward deductive validity. Do we not have here what Allan claimed to find, a separate group of rule-case syllogisms (which, because they contain a universal premise, would seem to be applicable only to humans)? Can Allan have been right about the examples, even if not about the theory? First of all, the first syllogism, if we read it in such a way as to make any sense at all, is not deductively valid. "Take regular walks" (for surely it cannot be "*Always* take a walk," or it would be as insane as *EN VII's* "*Taste everything sweet*") does not lead by any imaginable minor premise to the necessity of acting now. Second, the examples can be fitted perfectly well into the "good-possible" scheme: both major premises characterize a certain kind of activity as to-be-pursued or to-be-avoided—we assume this is expressive of the agent's desire. And the minors, however oddly, show how it is possible for him to realize the major. The example, in fact, makes sense

only within a general program of specifying the end. The rule "Take regular walks" can be traced back to my desire for health; it comes out of my work at specifying an important end and is one chosen way of promoting that end.

We do have general desires. When we analyze a major end, we very often come up with some general guidelines about the *type* of action to pursue or avoid in aiming at that end and in consequence we desire, in general, to perform actions of this type. Often we have not arrived at the "rule" by conscious reflection; often we are creatures of habit or instinct. An action is desirable insofar as it conforms in certain ways to our habits and/or instincts. If we note that a particular activity open to us now is of a type we are accustomed to doing, or regard as, in general, good to do, we count that as a reason for so acting. We reflect that courage is an important human virtue; this serves as a "rule" to guide our deliberation in particular situations. We may choose one action over another because it counts as an instance of courage and is thus a component of the good life for us. We are accustomed to walking home by route A rather than by route B; this habit also serves as a "rule," informing our particular choices. All this is uncontroversial; and if Aristotle's account had made no room for universal major premises, we would think there was something wrong with it. Even animals, to whom Aristotle denies "universal suppositions" (*katholou hupolēpseis*), have general desires and habits; we could well imagine a rule-like major premise for a lion: "Meat's good," or "Run away from hunters with guns."⁴⁷ Thus it would be surprising if Aristotle made no room for the rule-like; and his admission of the rule-like does not, in itself, tell us much about his theory. Some general guidelines must remain fixed; not everything can be left to situational judgment.

But this inclusion of rule-like premises in a theory of practical reasoning by no means commits Aristotle to the deductivist picture sketched above. We must now look more closely at the

⁴⁷ I would like to thank Gerasimos Santas for this suggestion.

status of these rules and their relationship to particular cases.⁴⁸ One possibility is that the rules are guidelines or rules of thumb, summaries of particular decisions, to be consulted for the sake of economy. In adopting such a rule we would be acknowledging that choices of this sort have, in other cases, been found to be appropriate on some grounds other than that they conform to the rule. Rules presuppose a rule-independent decision procedure. Another possibility is that the rules are objectively valid universals, true independently of the cases falling under them: true, for example, because deduced by valid inference from a priori first principles of action. It is the second view that Aristotle's deductivist interpreters must argue to be implied by the use of rules in the practical syllogism. To delineate the alternatives more clearly, we shall ask four questions of Aristotle's rules:

(1) What is the point of having rules? The summary view will answer that it is a question of economy: one can decide many routine cases more quickly and efficiently if one encapsulates the results of past decisions in the form of a rule. We do not want to go through a laborious deliberative procedure every time we have to decide whether to go walking; some relevant rules will help us avoid undue waste. The deductivist, however, will claim more: the rules are important because they are the objectively valid norms, in the nature of things, to which we must "attune" ourselves. They are not made by us for our use; they are laws of nature, to which we must conform if our lives are to be good.

(2) Which has the prior claim on us, the rule, or the decisions made in particular cases? The summary view holds that rules are posterior to cases and tailored to fit them: they ought, insofar as is possible compatibly with economy, to reflect all the relevant complexities of the particulars, and can be disregarded if they fail to do so. If, in a particular case, there is some reason to believe the generalization will not hold up, it is

⁴⁸ The discussion that follows owes a great deal to John Rawls's "Two Concepts of Rules,"—although the distinctions made here are, of course, not the very same ones that concern Rawls there.

appropriate to follow intuition instead. The deductivist will hold that in particular cases our job as agents is to attune ourselves to the rule, as a piano string will be tuned against a tuning-fork that provides an independent and prior standard of pitch. The rule is valid because of its relation to other rules, ultimately to first principles, and not because of its fidelity to particular cases. The scientific moralist regards it as his duty to use his theoretical skill "to correct existence," as Nietzsche observed with penetrating insight (*BT*, §13).

(3) A closely related question: Can the rules themselves be called into question, revised, possibly even discarded, in the light either of new experience or of a revised estimate of past experience? We may, claims the summarist, decide that our assessment of some of the cases on which we built the rule is in error, or that we made a mistake in reasoning from cases to rule. A new experience may cause us either to bend the rule a bit, or more seriously to doubt its usefulness. But the deductivist will, again, grant none of this. Since rules are either apprehended directly or deduced from other rules, our only possible mistakes will be very basic mistakes in apprehending the a priori or logical mistakes in deduction. Here we will speak not of *revising* the rule, but of apprehending it correctly. The rule itself is fixed and immune from revision.

(4) What is claimed about the relationships among the rules themselves? Are they held to form a system? Is every action-guiding rule consistent with every other rule? Can we, if we have a system of rational principles, ever encounter a situation in which rule *a* dictates action A, but rule *b* (equally valid) dictates not-A or some other action incompatible with doing A? In other words, will a proper system of rules ever generate serious practical conflicts? The summarist will allow that they can. The rough rules of thumb we have been considering—"Be courageous," "be moderate," "avoid jealousy," may well conflict in a particular case. Agamemnon's two practical principles, "Do not kill a member of your family," and "Obey the gods," did not save him from tragedy. These conflicts are contingently based; the values or rules themselves are not intrinsically in

conflict. But the summarist might well be pessimistic about the chances of planning a life so as to avoid such contingencies altogether. The deductivist's aim, in constructing his moral system, must be the elimination of conflict. As no two truths accepted into the body of an Aristotelian theoretical science ought to be incompatible, so with practical truths. Nietzsche's Socrates could not understand the "incommensurables" that were the stuff of tragedy (*BT*, §11). The aim of his scientific enterprise was to render everything both commensurable and consistent, to provide us with a system that would eliminate conflict, and tragedy with it.

We have so far had no evidence from the *MA* examples that would justify the stronger, deductivist reading. All that is suggested is that *sometimes* the want that enters into the best explanation of our actions is a general desire that can be expressed in rule-like form. Ultimately we will need to look beyond the theory of the practical syllogism for answers to these four questions. But first we must turn briefly to two other discussions of the syllogism that seem to cause difficulty for the account we have so far presented.

THE SYLLOGISM IN *EN* VII AND *DA* III

We have argued that the practical syllogism is essentially an explanatory model and that the explanatory scheme proposed involves the ascription to the agent of a desire and of a belief about what must be done if the desire is to be realized. The major premise may or may not be rule-like; what is important is that it mention some desire of the agent. This is the obvious reading of *MA* 7; two other discussions of the syllogism, more often analyzed, present a slightly different picture.

Both in *EN* VII.3 and in *DA* III.11, Aristotle refers to the practical syllogism in the course of explaining *akrasia*. (Here, of course, he will be attending only to human action: animals do not become akratic—*EN* 1147^b3–5.) A distinction of major and minor premises will obviously be useful in this context: we want to see clearly what the different antecedent conditions

for action are and at what different points interference might occur. Once again, as in the *MA*, Aristotle emphasizes the necessity of the agent's acting once he has formulated and combined the relevant premises. He again uses a parallel with theoretical reasoning:

And when there comes to be a single (sc. opinion?) from them, it is necessary that there (in the theoretical case) the soul assert what has been concluded, and, in the case of practical premises, that it do what has been concluded straightway (1147^a26 ff.).

At the conclusion of the "sweets" example that follows, Aristotle again insists that the agent must act: "It is necessary that the man who is able and is not prevented should at the same time also *do this*" (1147^a31).

We expect that the division of "premises" will follow the *MA* lines: one will be a desire, the other some sort of belief; if action does not follow, either the desire has failed, or the cognitive faculties are not doing their job, or there has been external interference. But we find, instead, a different theoretical distinction:

The one premise is a universal opinion; the other is about particulars, which are already in the province of sense-perception (*EN* 1147^a25 ff.).

Since one supposition and proposition is universal and the other is of the particular (for one says that such-and-such a man ought to do such-and-such a thing, the other that this is such a thing and I am such a man), then either it is the latter opinion, not the universal one, that imparts movement, or both—but the former is more static, while the other is not (*DA* 434^a16 ff.).

This theory does not seem to be incompatible with what was said in the *MA*; after all, the universal premise can be a general desire, and rules played a part in the *MA* scheme as well. It is

particularly important to note (as few commentators have) that neither of these passages suggests the rule-case model as a general theory, which will cover every practical case. Unlike the *MA* model, which is explicitly claimed to offer a general explanation of motion towards a goal, this theory is introduced only in the context of explaining *akrasia*, and no wider relevance is claimed for it. There are, nonetheless, some features of this account that should surprise or disturb us.

Aristotle seems to be pressing the practical-theoretical parallel so hard here that he calls the major (desire) premise "static" (whereas in *DA* III.9–10, 433^a21, 433^b10, it was "the one mover"); and he cites examples that are deductively valid, but completely crazy as explanations of any reasonable agent's conduct. "Taste everything sweet; this is sweet"—and if he is able and not prevented, he tastes (1147^a29–31). The rule, stated this way, and not in a looser, more plausible form ("I like candy"), produces validity at the expense of sense.⁴⁹ Furthermore, Aristotle once even seems to suggest that desire is external to the syllogism: "Everything sweet is pleasant, and this is sweet, . . . and it happens that desire is present" (1147^a32–34). Aristotle may be distinguishing between some bit of abstract reflection about candy and a really *practical* syllogism, which actually has a desire of the agent's as its major premise. This is the most plausible reading. But he does not state his intention clearly. Combined with the *DA* statement about the "static" universal, this might suggest to us that Aristotle here envisaged a class of "practical" syllogisms that were distinguished from their theoretical counterparts only by subject matter, and had no intrinsic connection with action. It is also suggested (though very unclearly) that the syllogism as such must have a propositional conclusion before the initiation of action, after which the agent "does what has been con-

⁴⁹ Cf. Anscombe, *Intention*, 61. Aristotle's choice of trivial examples should not be read as setting limits on his theory (cf. n. 53). But this case is different: the point is that no example structurally *like it*, even given a change of subject matter (e.g., "Do everything noble"), would be much help in settling on a course of conduct.

cluded."⁵⁰ But if the conclusion itself is a proposition, an affirmation of a decision, we wonder whether we must not invoke some *further* factor to explain why action follows the conclusion. Aristotle's main point in these chapters is to stress the necessity of acting once the premises are both active and combined in the right way (1147^a26–27). He cannot, therefore, be seriously endorsing the view that practical syllogisms are simply pieces of reflection that entail propositions, not actions. And in fact at 1147^a21 ff. he contrasts the learning and rote repetition of some principle of action with the stage at which it has become an integral part of the agent's pattern of conduct (*dei gar sumphuēnai*). This surely implies that he is thinking of the universal action-guiding principles as a part of the agent's system of desires. But his interest in deductive validity has led him to make some potentially misleading claims.

We can find reasons for this stress on the deductive model: first, an eagerness to emphasize the necessity of acting (though, ironically, the deductive syllogism with its propositional conclusion leaves this more obscure than before); second, Aristotle's legitimate interest in the universal-particular distinction in pinpointing sources of error in deliberation (cf. 1142^a20 ff.). He may indeed believe that in every case of *akrasia*, the major premise is rule-like and the minor particular; and this seems plausible. But we must remember that, whatever its internal

⁵⁰ *Hotan de mia genētai ex autōn* (1147^a26) is inconclusive; *mia* could refer either to *doxa* or to *protasis* and *mia doxa* could mean a proper fusion of the two premises as well as a propositional conclusion. The following words more strongly imply a separate propositional stage: *anagkē to sumperanthen entha men phanai tēn psuchēn, en de tais poiētikais pratein euthus*. Translators tend to render *pratein* as intransitive, but the position of *to sumperanthen* makes it most likely that it is to be taken as the object of both *phanai* and *pratein*. In the theoretical case the soul must affirm *to sumperanthen*. In the practical case, Aristotle suggests that there is a stage of drawing, at least in thought, a propositional conclusion, after which the agent "does what has been concluded." Similarly, in the example that follows, Aristotle concludes not that the man "who is able and is not prevented" must straightway do the action, but that he must straightway *also* do the action (*hama touto kai pratein*, 1147^a31)—implying that he must both think or say the conclusion of the syllogism and go on to act. Cf. Cooper, *Reason*, 48 n. 61.

difficulties, this is not, as the *MA* account is, an attempt to proffer a generic explanation of action. And it is primarily to the *MA*, rather than to these chapters, that we should turn for an understanding of Aristotle's theory of explanation and his use of syllogistic language in developing that theory.

The theory of the practical syllogism is, then, an attempt to provide a model for the adequate explanation of animal activity and to show us that an explanation of a certain type *is* adequate, by invoking a parallel with the two-premise structure of the theoretical syllogism. Unlike Malcolm and von Wright, Aristotle insists that the conclusion is *entailed* by the premises, that action follows "of necessity." Whether we elicit the explanation from the agent, or provide it ourselves as scientists, it must have this strong form; and a psychological theory will be adequate only if it provides strong and adequate explanations. Let us, with von Wright, imagine an agent who wants to kill a tyrant. He has figured out that to attain this end (which we assume to be an important member of his system of ends, and in conflict with no other important end) he must shoot the tyrant at *t*.

He stands in front of the beast, aiming at him with his loaded revolver. But nothing happens. Must we say that he is "paralyzed"? He is subjected to medical examination and nothing is found which would indicate that he was physically prevented from carrying his intention into effect. Must we say that he gave up his intention or that he revised the requirements of the situation? He refuses to admit either alternative. Must we say that he is lying? These questions aim at constructing a case in which to say that he was prevented, or forgot about the time, or gave up his intention, or reassessed the requirements of the situation, would have no other foundation than the mere fact that he did not set himself to action in accordance with the premises.⁵¹

⁵¹ Von Wright, *EU* 116–17. I have chosen to discuss this example, rather than Malcolm's more elaborately and precisely worked-out case, because of its accessibility to the reader.

Von Wright insists that a claim that the validity of the practical syllogism should be a standard for interpreting the situation is sheer "dogmatism." Norman Malcolm's more subtle argument insists that although only a syllogism of the proper form would *explain* the action or make it comprehensible, we ought to allow for cases in which there simply is no explanation. To Aristotle (especially in view of his psycho-physical views—cf. Essay 3) this would probably seem like reactionary irrationalism. His account of *tuchē* in *Physics* II is aimed at opponents who limit, as Malcolm does, the sphere in which explanations can be sought or demanded. This is in part a pragmatic move—for the man who was persuaded by Malcolm would be less likely to press the search for a theory that *would* account for the recalcitrant case. But it is a deeper conceptual point as well: the man who asserts that there were a desire and a belief of the relevant sort (and no prevention), but that, nonetheless, no action ensued, does not really know the meaning of desire, belief, and/or action. And a scientist who asserts that there is an animal motion for which no explanation can ever be offered, since it happened by *tuchē*, fails to understand the meaning of both motion and *tuchē*. For *tuchē* is not a cause alongside the others; every action explicable as due to *tuchē* has, under some description, an adequate explanation.⁵²

To assess the relative merits of Aristotle's position and that of von Wright, Malcolm, and other believers in an irreducible *automaton* would require a full analysis of *Physics* II; and perhaps even then the question would reduce to one of taste or temperament. But there is surely more than "dogmatism" at work here; there is a rich and sophisticated picture of human scientific activity, and a distaste for the obscure that is one of the deepest and most characteristic features of Aristotle's scientific writing.

⁵² Cf. Wieland, "The Problem of Teleology." This takes us into the muddy issue of Aristotle's position on agency and determinism. If he does not want to introduce any randomness into the ante-action psychological sequence—and if he believes that each psychological process is, under another description, a physiological change—can he in fact avoid the consequence he considers untenable in *DI* 9, that deliberation and planning are merely epiphenomenal (cf. 18^b26 ff.)? Cf. Essay 5, n. 69.

It should by now be clear that the best explanation of the action even of a human agent will often differ considerably from the content of that agent's actual deliberation. But Aristotle will claim as well that part of being a fully rational agent is having a system of desires and being able at least to justify actions with reference to that system, whether or not one has explicitly gone through all the deliberative steps. Thus the practical syllogism serves a dual function: as a model of explanation generally, and, in the case of human rational agents, as a schema for the justification of action, often also for conscious deliberation. Examples like the doctor case from *Metaph.* VII, the "walk," "house," and "cloak" examples from *MA* 7, the pleasure syllogisms in the discussion of *akrasia*, and the account of deliberative specification in *EN* III do show us agents consciously deliberating back from ends to what is in their power. (In the *akrasia* discussion Aristotle even claims that consciousness of a principle has a distinctive efficacy: the man who babbles the rule like a drunk reciting Empedocles is not *activating* it, and it does not enter—except by its absence—into the best explanation of his action. Thus a good explanation would have to distinguish between conscious activation of a principle and mere possession of it.) There seems to be no reason why the syllogistic model could not be used for illumination at any level in the deliberative hierarchy.⁵³ I want health; if there is to be health, there must be this—and so on, until he reaches what he can do. Of course we will not know whether

⁵³ Hardie and others have suggested that the *MA*'s examples are far too trivial in subject matter if the syllogism is intended to provide anything like a schema for all deliberation (*AET* 249; but contrast the concession on p. 231). This objection is invalid. It is most reasonable that in illustration of a complex process Aristotle should have chosen examples that are simple and easy to follow and where we do not need to include a lot of exposition concerning the agent's situation and character. Aristotle does not believe that ethical reasoning has a *form* distinct from other kinds of practical reasoning, and it is easy, once we grant him this point, to understand his preference for non-moral examples in a general exposition. Von Wright's stock example of the practical syllogism in *VG* concerns a man who is running to meet his girl friend at the station.

we have ascribed the right wants and beliefs to him until we see whether he takes action or not. But it is equally true that we have not fully explained the action until we have asked "why" as far back as is feasible. We will not be satisfied with the knowledge that he gave the massage to restore the patient's balance of humors, at least until we discover that that is a constituent of health. We will not *really* have explained the building of a house until we see how the choice to build, and, beyond that, the choice to become a builder, fit with the rest of an agent's desires and needs. The best explanation of an animal's behavior will refer only to his instincts and needs as a certain sort of creature, and to immediate stimuli; there is no larger picture of ordered desires and dispositions. With children, and some adults, we will not be able to get much further. But part of being a rational adult, Aristotle will argue, is behaving in such a way that your actions conform to some specifiable and relatively systematic picture; and we will not have offered an adequate account of such a man's behavior until we have placed the particular action in a larger pattern of this sort.

In practice, it will be extremely difficult to come up with explanations that genuinely conform to the anankastic model as we have sketched it. Aristotle's examples reflect this. Does anything important (e.g., health) ever depend in this strong way on the particular walk I take here and now? I can explain the behavior as part of a practice that is itself necessary for the maintenance of health; but can I explain why the time should be *now*? I might add all kinds of specifications: "It's good to run two miles five times a week, except in weather below 20° F. and in heavy rain." This is my specification of one component of health, which is itself a necessary part of the good life for a man. And this will, of course, fully explain my failure to go jogging when the temperature is -2° (the second half of Aristotle's "walk" case); but will it conclusively explain why, on this particular warm, sunny day, it is *necessary* for me to run? I may think that I will not have good weather the rest of the week, so if I want to make sure of my five times a week I had better run today. But suppose I have good reason to believe that

it will be sunny both today and tomorrow, so that I could equally well run the fifth time either day; but somehow (I may even flip a coin) I decide on today. What is the explanation? And is there one of a strong, anankastic type? The Malcolm suggestion that we do not *want* a model of explanation so strong that it leaves no room for the arbitrary has some intuitive appeal here. Aristotle's response would, I think, be to acknowledge the practical difficulties of finding all the relevant explanatory factors, but to deny that the search for explanation could stop until these strong conditions had been met.

Despite these practical difficulties, then, Aristotle does hold that the desires and reflections of a rational agent form some sort of system, and that the practical syllogism can help us elucidate this system. What he nowhere implies is that this system is the closed and self-consistent one demanded by the deductivist. Aristotle hopes he can provide adequate explanations for particular human and animal actions, and, further, suggests that the explanation of human action should refer to the position of a goal in the agents system of goals: "Insofar as something else is done for the sake of this and insofar as it is an end of things done for the sake of something else, thus far it imparts movement" (*MA* 700^b26-8). But it is not inconsistent with these claims to see the system as open, subject to revision, and capable of generating conflicts. If Agamemnon does sacrifice Iphigenia, we will be able to explain why he did so: the need to obey the gods' command overrode his reluctance to become a murderer. But the theory of explanation does not tell us that this choice, even if the best possible in the circumstances, did not involve wrongdoing; it does not commit us to eliminating the incompatible claim. From the fact that a choice is made according to the best available rational principles, it does not follow—as Agamemnon thought it did—that the action is "right;" still less that it is right for him "to desire with passion exceeding passion" (*Aes. Ag.* 215-17) the chosen course. If an agent acts from a system of practical principles that dictates the elimination of what we feel are legitimate practical claims, because they conflict with other such claims, is that to be called

rationality? Aeschylus' chorus is shrewder: they call it madness, and "thinking the all-daring" (221). One hallmark of genuine rationality might turn out to be the avoidance of immoderate claims on its own behalf. "The man who observes the mean is one who calls a thing by its own name, being truthful both in life and in word, owing to what he has, and neither more nor less" (EN 1127^a23 f.).⁵⁴

RULES AND PRACTICAL CONSISTENCY

So far our conclusions have been, for the purposes of our central question, largely negative. Aristotle does not seem particularly interested in using the theory of the practical syllogism to establish a deductive hierarchy such as we have described; but there is no clear evidence that he would be in principle opposed to such a project. But that he does in fact oppose himself to Socrates is, I think, clear from other observations he makes concerning rules and the status of an ethical science. The argument will draw on our reading of EN I and Aristotle's claims there about the difference between ethics and the theoretical sciences. I have argued that these are not simply apologies for a job imprecisely done, but a serious warning not to attempt more (cf. Essay 1, Appendix). There can be a kind of objectivity in ethics, but this does not base itself on the grasping of first principles that exist independently of our needs, interpretations, and valuations. Instead, we must base our reflections on a con-

⁵⁴ The doctrine of the *meson* does not, of course, amount to the claim that between any two extremes a "golden mean" can be found; the mean is not reached by working in from the extremes, and Aristotle's doctrine does not imply "that the contradictions in human attitudes that erupt into social antagonisms are not inherent in the world but are caused by lack of reasonableness," as is claimed by Kolakowski ("In Praise of Inconsistency," 216). Kolakowski's criticism of the Aristotelian doctrine as reflecting a longing for synthesis and a belief that rationality is committed to the removal of contradiction shows us another way in which the belief in a scientific Aristotelian ethic could get its start—a way that seems to be equally unjustified by the evidence. (On the mean, see Urmson's fine "Aristotle's Doctrine.")

ception of human nature that we hope will win the approval of all rational men in what we might call "reflective equilibrium." Now we must show that the structure of the "system" so grounded, and the role played by rules in that system, are not what the deductivist requires.

We asked four questions of Aristotle's rules: (1) What is the point of having rules in ethics? (2) Is priority given to rules or to particular decisions? (3) Are the rules revisable? (4) Do the rules form an entirely self-consistent system, like a system of beliefs? We must now turn to other texts for the answers that were not explicitly provided by the theory of the practical syllogism.

(1) Aristotle never claims that rules are important because they represent objective norms valid independently of particular decisions. The virtues are defined with reference to the decisions of a competent judge: the rule of the mean is the one such a judge would set up (1107^a1). Aristotle urges agents not themselves practically wise to adopt a general principle based upon the particular choices of agents generally agreed to be competent; a rule can be a guide for moral learning and a tool for securing orderly behavior in those who, for whatever reason, have not attained full virtue. If we were asked to justify a rule of practice we would point not to its place in a deductive system following from true a priori premises, but to the accuracy with which it encapsulates the choices of practically wise men.⁵⁵ "Among statements about conduct, those that are universal (*katholou*) are more general (*koinoteroi*), but the particular are more true—for action is concerned with particular cases, and statements must harmonize with these" (EN 1107^a29–32). Rules are not true a priori, but only insofar as they harmonize with judgments about particular cases.

In his discussion of justice, Aristotle once again denies that his rules are natural laws in the sense required by the deductivist. Among the gods, he tells us, there may perhaps be unchang-

⁵⁵ Compare the relationship between rules and the judgments of a competent judge in John Rawls's "Outline of a Decision Procedure for Ethics."

ing and immutable justice existing by nature; among men all justice is *kinēton* (mutable, revisable), though there will still be reason to call some principles natural (as meeting some conditions of broad reflective equilibrium) and some non-natural (as varying from culture to culture) (*EN* V.7, 1134^b27–30). Here Aristotle appears to set himself against theological and Platonic naturalism as clearly as he sets himself against a relativism that holds that there is no possibility of rational agreement on ethical principles.

Why, then, *do* we need rules? Aristotle suggest several different reasons. First, as we saw above, rules are aids to moral learning: when we are not yet practically wise, we need to follow rules that summarize wise judgments. But even the virtuous adult will often have need of universals that are *koinoteroi* than the particulars. Rules save time; in private morality, as in the public legal system, following a general judgment carefully based on good prior decisions is preferable to a hasty particular choice as well as to the waste of time involved in formulating an adequate one. "Laws are made after long consideration, whereas decisions in the courts are given at short notice, which makes it hard for those who try the case to satisfy the claims of justice and expediency" (*Rhet.* 1354^b3 ff.). Laws are also stable: if we have some general guidelines, we are less likely to find our judgments distorted by the passion of the moment. The rule of law is to be preferred to rule by decree, not because there is some eternal law, but because most rulers are untrustworthy and unstable (*Pol.* 1286^a6 ff.; *EN* 1134^a35 ff.; *Rhet.* 1354^b8 ff.). The account of *akrasia* suggests a similar point about moral rules: for Aristotle here seems to believe that if a syllogism of the good, with its universal first principle, is fully active, the agent will not err from passion. Rules in the private sphere, law in the public, are necessities, not desiderata: necessary because we are not always competent agents, not always fully virtuous. We lack information, we reason slowly; the judgments even of good men can be distorted by desire. If we *were* really practically wise all the time, we would seldom require rules. If we were all friends, justice would be otiose

(*EN* 1155^a22). In science, too, Aristotle insists that general accounts can help to summarize particular findings, or to extrapolate from findings to as-yet-unscrutinized cases. But once a case is studied in detail, "then we should trust perception rather than the rule" (*GA* 760^b28 ff.).⁵⁶ Aristotle frequently makes the general claim that the universal has no separate existence apart from the particulars.⁵⁷

(2, 3) An answer has already begun to emerge for our second and third questions, which it will be convenient to treat together. The particular cases appear to have the prior claim on us, the rule only if it tallies with what a competent judge would say about the cases. Our aim as agents is to become such competent judges, and, once we are, rules will serve us only as aids and time-savers; our ultimate responsibility is to the complexities of the particular. Laws are authoritative only insofar as they do not err with regard to the particulars (*Pol.* 1286^a23–24). And the equity (*to epieikes*) of the agent must always be ready to correct the rules of justice where they fail to apply correctly:

All law is universal; but about some things it is not possible for a universal statement to be correct. Then in those matters in which it is necessary to speak universally, but not possible to do so correctly, the law takes the usual case, though without ignoring the possibility of missing the mark . . . When, then, the law speaks universally, and something comes up that is not covered by the universal, then it is correct, insofar as the legislator has been deficient or gone wrong in speaking simply, to correct his omission, saying what he would have said himself had he been present and would have legislated if he had known (*EN* 1137^b13 ff.).

The law is a summary of the particular decisions of a legislator and should be supplemented and/or revised (as he himself,

⁵⁶ Cf. note on 698^a5 and 13, and Essay 2 for further comments on this claim.

⁵⁷ *Metaph.* VII.13; VII.16, 1040^b26, 1041^a4; *APo* 85^a31; also *Metaph.* 1049^a28, 1053^b16, *GC* 332^a16.

were he present, would have revised it) in the light of new cases. A man who tried to make every decision according to a principle held firm and inflexible would, Aristotle continues, be like an architect who tried to use a straight rule on the intricate curves of a fluted column. Instead, the good architect will measure with the flexible "Lesbian Rule," which "bends to fit the shape of the stone and is not fixed" (1137^b30).

Nor, I believe, does Aristotle mean to say in these passages that the incompleteness of the rule is simply a matter of our ignorance and that, if a really good set of rules for human conduct were ever worked out, it would take precedence over the judgments of agents. He tells us that practical matters are in their very nature "indefinite" (*aorista* 1137^b29)—not just (so far) insufficiently defined. The general account of ethical matters is imprecise, he tells us, not because it is not as good as a general account of such matters can be; "the error is not in the law, nor in the legislator, but in the nature of the thing, since the matter of practical affairs is of this kind from the start" (1137^b17–19). The account must remain incomplete because it is of the essence of the practical that it is not amenable to scientific treatment:

Matters concerned with action and questions of what is advantageous never stand fixed, any more than matters of health. If the universal account is like this, the account of the particular cases is all the more lacking in precision. For such cases do not fall under any science (*technē*) or precept, but the agents themselves must consider what suits the occasion, as is also the case in medicine and in navigation (1104^a3–10).

There is no fixity; as we said above, even the "naturally just" is *kinēton*, revisable; no imaginable set of precepts could adequately cover the indefinite matter of the practical. It is not only that we have not yet attained in ethics the precision of the natural sciences; we must not expect, or even attempt, to do so, or we risk distorting the nature of what we study. "Every rule concerning what should be done *ought to be said in outline*

(or summary), and not with precision" (*EN* 1104^a1–2).⁵⁸ The purpose of the investigation is *not* theoretical wisdom, as in the sciences (1103^b26). It is plain that practical wisdom is not deductive scientific knowledge (*epistēmē*) (1142^a23).

Given this picture, it is not surprising that Aristotle places such emphasis on the role of *nous*, or situational perception, in determining on a course of conduct. Even a deductivist might still insist that it takes some such faculty to seize on the relevant features of the particular case and to subsume it, in consequence, under the relevant rule. But then *nous* would have to justify its judgments with reference to the rule, and could not be itself a source of rules. Aristotle, however, clearly holds that the exercise of this faculty is itself prior to rules (though not necessarily temporally prior in moral learning) and is the ultimate source of these rules themselves: "The universal must come from the particulars; and of these one must have perception, and this is *nous*" (1143^b4–5; cf. also 1142^a23).⁵⁹ Rules or general precepts will be useful in many ways: to educate the desires, to save time, even to embody part of our conception of the good life ("Act according to courage," "Benefit friends for their own sake"). What they do not do is to remove from us the responsibility of scrutinizing all the complexities of a situation and fitting it somehow into the intricate picture of the good life that each mature agent has—perhaps even modifying, or further specifying, that picture in the light of a new discovery. The man of practical wisdom "delights in virtuous actions . . . as the man trained in music delights in beautiful melodies" (1170^a8–10). And although Aristotle is not, in that passage, speaking explicitly of moral judgment, the analogy provides a

⁵⁸ Ross's translation, "The whole account of matters of conduct must be given in outline and not precisely," is ambiguous and might be read only as a concession to our present limitations. Ostwald's "is bound to" implies this reading rather strongly. But the Greek *opheilei* is unambiguous. Bonitz's examples indicate that it is quite a strong injunction to pursue the course suggested. Unlike the other "must" words more frequently used by Aristotle, it implies a duty, not simply a necessity.

⁵⁹ These two passages are discussed very well by Wiggins in the last section of his article.

useful and accurate way of looking at his theory of *nous*.⁶⁰ The music critic will make use of some general guidelines in assessing a work; but part of critical competence is a readiness to discover new merits, to enlarge and redefine the accepted standards of the beautiful. As the fine critic is more keenly responsive to the particular work than the ordinary man, and less subservient to prevailing norms or standards, so the man of practical wisdom is the most flexible among us, his moral sensibility the least ossified by obedience to the universal. And as the critic can show a way for the many, enabling us to come to see a work, hence the world, in a new way, so the truly moral man will be not only imitative, but creative, seeing keenly into the confusing "matter of practical affairs" and shaping our discriminations. For the deductivist, the agent can be no more than Maritain's piano tuner. For Aristotle, he is a critic, and an artist.

(4) If the "matter" of the practical does not admit of systematization at all, *a fortiori* it does not admit of formulation in a consistent set of rules. We will therefore expect Aristotle to take issue with the picture of moral conflict and of the moral emotions implied in the deductivist project. The statements cited in the preceding section clearly imply that he viewed conflict as ineliminable from the practical domain. That is the way this peculiar "matter" is. In *Metaph.* IX.5, he tells us that a man may *rationaly desire* (*boulētai*) to perform two incompatible, or even contrary, actions at the same time and not be able to perform them (1048^a21–24). He does not infer from this that one of these desires was not rational after all; both are *boulēseis*, and the failure to fulfill such a rational claim can be expected to produce regret. The account of the "mixed actions" in *EN* III.1 concludes that such conflict cases involve an element of compulsion, since it is contingent that the two claims clash as they do, and one would not have neglected the other claim (done the wrong or disadvantageous act) *haplōs*—that is, in the absence of such an ineliminable conflict (1110^a4 ff.). But these actions are still not involuntary; there is occasion for blame and/or pity, de-

⁶⁰ For some perceptive comments about this analogy, I am indebted to Christine Korsgaard.

pending on the nature of the case. Aristotle's discussion of these interesting examples is sketchy, and little is said about the moral emotions of the agent. It seems evident, nonetheless, that he does not adopt a general project of removing this sort of messiness from ethics, but simply accepts that these are situations that are bound to arise in the course of a human life. "It is sometimes difficult to decide what should be chosen ahead of what, and what endured in return for what" (1110^a29–30), he observes like Socrates in the passage cited. But he conspicuously fails to draw the Socratic conclusion that our "salvation" depends on finding a way to eliminate the perplexity. In *Pol.* III.12, Aristotle claims (appropriately) to have reduced a position on distributive justice to absurdity by showing that on this view all goods must be commensurable—wealth with birth, musical talent with size and strength (1283^a3 ff.). "This is impossible," he concludes brusquely—less interested, apparently, in the "salvation" of the "science of measurement" than in the multiplicity of the appearances, to which any account of rationality must remain faithful.

There is, however, one jarring note. In *EN* IX.4, Aristotle paints a picture of the virtuous man's relationship to himself and to his past that suggests that being truly virtuous is sufficient for the avoidance of wrong action, hence of regret and remorse. The good man "is harmonious, and he desires the same things with all his soul." He both wishes the good and does it (1166^a13 f.).

A man of this kind wants to live his life with himself. For to do so is pleasant. For the memories of past actions are delightful, and his hopes for the future are good—and such hopes are pleasant. . . . And he grieves and takes pleasure with himself more than any other man; for the same things are always painful and pleasant to him, not one thing at one time, and another at another. He has just about nothing to regret (1166^a23 ff.).

This portrait of the harmonious inner life of the good man, whose memories delight him, whose hopes are not tainted with

remorse, strikes us as too idyllic. On the view we have ascribed to Aristotle, even a good man may at some time do something, through no fault of his own, that he will have occasion to regret. He may be throwing his spear at the target in full accordance with the rules of the gymnasium and accidentally kill a friend who rashly runs in the way; and we will think the worse of him if he *does* feel delighted about living with himself after that. It is not part of goodness to have eliminated regret from one's practical life. The man who has such an accident, and feels the regrets, has for this reason a less enviable life, but he is not thereby less good. And perhaps he may even, like Agamemnon, have, again through no fault of his own, to *do* something terrible. Here again, though we may judge he acted for the best, and in accordance with some rational system of principles, and though we may pity rather than blame him, we will feel that he is morally insensitive if he feels no unpleasant emotions. It is a great achievement of Aristotle's picture of virtue to have given emotions, as well as actions, a central place in the good life and to have made them important in the assignment of praise and blame. Surely a man who feels no regret in such situations, who lives harmoniously with himself, is *not* displaying a mean disposition, or responding as a man of practical wisdom would. Perhaps it is for this contingency that Aristotle provides the reservation "*just about* nothing to regret."⁶¹ The man is without regrets insofar as it is possible for him to choose fully his course of action, but if the confusing matter of action has put him in the place of Agamemnon at Aulis, he would not be fully good if,

⁶¹ *Hōs eipein* is not always translated with this nuance, but it is usually the right one—cf., among other discussions, Dodds's note to *Gorgias* 450 b7. Another possibility would be to understand *ametamelētos* to mean "having no second thoughts," i.e., not regretting the actual decision, rather than "feeling no unpleasant emotions." The entire chapter is peculiarly Platonic, implying as it does that a wicked man must be rent by internal conflict. The general theory of the virtues, with its distinction between virtue/vice on the one hand and self-control/*akrasia* on the other suggests instead that the feelings of the *akolastos* are in accord with his (vicious) general principles.

like Agamemnon, he *did* remain self-satisfied and his own best friend.

CONCLUSION

Here and in Essay 1, we have tried to elucidate the aims of Aristotle's ethical enterprise and the status he hoped to claim for it. We have seen him attempting carefully to forge a middle path between sophistic relativism and scientific deductivism, one that will allow for genuine objectivity in ethics without abnegating our responsibility to the shifting and difficult *phainomena* of action. There is, as far as we know, no "true life-plan," just as there are no ideal pianos or heavenly tuning-forks. There are, nonetheless, pianos that are well and badly tuned according to a public and (let us suppose) generally agreed standard. And there are men whose lives can be agreed by rational men to be good or bad, without appeal to extra-human values.⁶² Aristotle saw the importance, in our attempts to fashion a life, of conceiving of ourselves as members of a certain kind, the human species. Practical values are socially learned; one could not imagine becoming virtuous without paradigms (one's elders) and "mirrors" (one's friends).⁶³ The solitary life would be the life of a god or a beast; it would not be life as we know it, nor would it contain the practical virtues. And these values are also socially *justified*. We retain throughout our lives an interest in defending and explaining our actions to our fellow human beings—defending them not as good *simpliciter*, but as good actions for the sort of being both we and they are, components of or means to a good human life. If men did not require each other's approval, if we had no interest in justification, life would, again, be either Olympian or bestial, but hardly life as we know it. This, and not the need for extra-human support for our values,

⁶² The piano analogy is, however, still defective, since the standard is conventional and arbitrary, as the standard of human excellence is not.

⁶³ For some very perceptive comments about the role of friendship in Aristotle's account of moral learning, cf. Cooper's "Aristotle on Friendship," forthcoming.

is for Aristotle the motivation behind ethical inquiry and defines its aims and limitations.

In the service of these needs, Aristotle proposed the practical syllogism as a model for explanation. His use of the practical-theoretical parallel elucidates the notions of wanting an end, understanding a necessity, and undertaking action; it indicates what an adequate explanation will look like and what psychological states can be regarded as sufficient conditions for action. As elaborated for human agents, the theory also indicates that the rational agent will justify his actions by showing how they fit into some system of ends that he has worked out and is continuing to work out for himself. To have some such network and to act accordingly is necessary for rationality. But here Aristotle stops short. He does not characterize the system of ends as closed and consistent or as a deductive framework depending on a priori first principles. He vigorously denies that ethics can be made scientific in this way, adopting a picture of practical conflict and practical truth that is implicitly opposed to the Socratic picture and contests both the possibility and the desirability of its aims. To oppose this project of a science of practice is not, for Aristotle, to concede much to the obscure or the mysterious; he continues, as the practical syllogism indicates, to demand a great deal of explanations and even implies that every action is potentially explicable. But his scientific optimism is not Socratic, linked as it is with a very different account of the nature of practical knowledge and of the moral emotions. Socrates, in Nietzsche's telling phrase, looked at the practical conflicts embodied in tragedy with "one great Cyclops eye" (*BT*, § 14) and failed to discriminate differences of depth and distance. Everything appeared to form part of the same plane, all goods were commensurable. Aristotle's richer and more balanced vision sees as the end of ethics not "salvation" or scientific sureness, but a constantly evolving rational agreement among competent and serious men.

ESSAY 5

THE ROLE OF *PHANTASIA* IN ARISTOTLE'S EXPLANATION OF ACTION

"We see our lives from our own point of view; that is the privilege of the weakest and humblest of us."

Isabel Archer, in Henry James's
The Portrait of a Lady

Studies of Aristotle's theory of *phantasia* have often been one-sided. Critics claim that in introducing and developing the notion, Aristotle's main interest was in explaining how we can be deluded by false appearances such as hallucinations and dreams and, on the other hand, how we are able to retain a memory of an object in its absence. Studies that claim priority for this set of interests, using *De Anima* III.3 and parts of the *Parva Naturalia* as their main texts, have tended to neglect the many problems connected with the broad role Aristotle gives *phantasia* in the explanations of action in *DA* III.9–11 and in the *De Motu Animalium*, and the difficulties in working out what connections Aristotle means to claim there are among *phantasia*, desire (*orexis*), and thinking (*noēsis*). This area of Aristotle's concern is left to one side as parasitic on the first and of smaller interest philosophically. Freudenthal, for example, remarks: "Aber die Besprechung aller diesen Punkte würde eine Ausführlichkeit verlangen, die mit der Wichtigkeit des Gegenstandes in keinem Verhältnis steht: sie muss daher hier unterbleiben."¹

But an understanding of these neglected passages seems to be crucial for the analysis of Aristotle's theory of action. For *phantasia* and desire are jointly necessary conditions for animal motion (*DA* 432^b15 ff.), and *phantasia* is a necessary condition for desire (433^b26–30), which must "prepare" desire before

¹ Freudenthal, *Phantasia*, 59.

desire can lead to action (*MA* 8, 702^a18 ff.). If we succeed in accounting for *phantasia*'s role in these passages, we will have shed much light, as well, on other accounts of its activities. For it is unsound to assume that we should use the few "decaying-sense" passages that mention *phantasia* to illuminate the action contexts, but not *vice versa*; the latter are just as valuable evidence of Aristotle's interests and views. Aristotle uses the verb *phainesthai* (appear) and related words in the analysis of a wide range of experiences. His account of the faculty of *phantasia* seems to be closely tied to his usage of the verb and suggests a very general interest in how things in the world appear to living creatures. This interest is developed both in his treatment of the special problems of delusion, dreaming, and memory, and in his study of motivation, where the faculty is given the central role we have indicated. There seems to be no canonical theory of *phantasia* in Aristotle, but rather a number of assorted observations, sometimes apparently inconsistent, of varying length and technicality. Even the detailed exposition in *DA* III.3 is internally inconsistent on a number of important points; it should not be used, as it often is, as the key to all other uses of *phantasia* and related words in Aristotle. It will be argued that only Aristotle's basic interest in appearing, and not the decaying-sense theory put forward at the end of III.3 and in parts of the *PN*, can serve to explain the extended role ascribed to *phantasia* in action contexts.

Any analysis of Aristotelian *phantasia* must confront a certain prevalent view of its workings: that *phantasmata* in Aristotle are always mental images that resemble the things they represent and are to be contemplated as internal pictures by the living being. Aristotle's general claims that all thinking requires *phantasmata* are usually interpreted to mean that thinking requires such internal objects as its raw material.² The suggestion is that Aristotle was led, in his desire to explain delusion by dreams, etc., to form a theory of imagining that requires a

² This theory is given a particularly clear exposition in Sorabji's *Aristotle on Memory*, 6; also see Hamlyn's note on *DA* 431^a8 and those of Hicks on 428^a11, 433^b28.

pictorial representative image to accompany every thought, and, possibly, every perception. One reason for the neglect of the action contexts is that it is assumed we have explained them sufficiently once we have read mental images into them.³

There is, however, much less evidence for the image-view of *phantasia* than has usually been supposed. Images do not seem to be central to the theory, nor is the theory vulnerable to many of the objections we might raise against an image theory. The clear connection of *phantasia* and *phantasma* with a theory of pictorial representative images is limited to a few passages in the *DA* and the *PN*, where Aristotle is constructing a physiological hypothesis concerning "decaying sense." (Nor are *phantasia* and *phantasma* Aristotle's only or even favorite terms in such contexts.) There are many more passages that could quite adequately be explained without invoking images and where it seems more fruitful to emphasize the connection with *phainesthai*. Some passages make no sense at all if images are read in. The extension of *phantasia*'s role in action contexts to cover operations concurrent with those of *aisthēsis* and in the presence of the object is especially hard to explain using images as a key.

The prevalence of the image view of *phantasia* can in part be explained by the prevalence of the empiricist view of imagination and related phenomena. Many previous Aristotle scholars appeared unable to conceive of any alternative to this interpretation—except the clearly false view that *phantasia* is, for Aristotle, a kind of propositional judgment.⁴ Since the image view seemed generally satisfactory to many critics who ascribed it to Aristotle, it was easy for them to extend it into passages that gave no direct evidence of its presence. But it should be plain

³ As is the usual practice of Ross (*DA*), Hicks, and Hamlyn. Rees's "Aristotle's Treatment" is more flexible in approach, but still dwells little on the serious problems raised by *DA* III.9–11 and the *MA*.

⁴ Thus Rees, for example, reads every passage either as a "propositional" use (involving a quasi-judgment) or as importing images. We must examine Aristotle's generic notion of the *kritika* (faculties that make distinctions) and ask in what respects *phantasia* is like and unlike judgment. (Cf. the note on 700^b20.)

by now that it is not the only account of such questions to be given, and hence need not be Aristotle's if he is discussing these questions. A look at some of the shortcomings of an image theory may help us to approach Aristotle's account both with less bias and with sharper critical perception.

The theory that has been espoused by many and frequently ascribed to Aristotle I shall take to make the following two basic claims:

(1) Imagination in all cases involves images that represent in virtue of some similarity.⁵

(2) Imagination always involves two logically (though not necessarily temporally) distinct processes: the having of an image (it is either produced or somehow impressed), and its inspection or contemplation.⁶

I take (2) to imply that, as in the case of a picture, I can potentially get from the image more information than I intentionally put there when I was producing it. (1) and (2) are logically independent. I might hold that the image must be similar without granting that there is more to be found in it than I put there; I might also insist on the picture-like density of the image while allowing it to represent in some other purely conventional way.

There are many ways of attacking this position, and I do not intend to examine all the ones that have been tried.⁷ I will simply set out a few objections to the theory for the sake of making my own view relatively clear and as an introduction to my account of Aristotle.

⁵ Not all image theories are this dogmatic, of course, and I will conclude that there is room for some form of image theory as a part of a general theory of awareness.

⁶ One recent presentation of an image theory that makes these features especially clear is Price's "Imageless Thinking," esp. 143 ff.

⁷ Some of the more interesting criticisms are: Wittgenstein, *PI*, II.xi; Sartre, *L'Imaginaire*, especially 20–21; Dennett, *Content and Consciousness*, 132–41. Ryle's chapter on imagination in *The Concept of Mind* is important, but confusing on a number of points. Cf. the criticisms by Shorter, "Imagination," and Ishiguro, "Imagination."

(1) One very common line of attack has been to ask about the status of the image: what sort of entity is it, and in what sort of space? How does a non-physical object come to have dimensions? etc. I do not see that this is a very telling objection. It seems in principle no more difficult to account for images within a physicalist picture of mind than it is to account for, e.g., sensations. The question, "Where is the image?" is not very different from the familiar problem about the location of sensations (i.e., if my pain is identical with a brain state, how can I say the pain is in my finger?) and could be solved in the same way, whatever way one might choose.⁸ If one held a physicalist theory that committed one to trying, insofar as possible, to discard the language of the mental, one would presumably get rid of image-talk along with much else. But there are other objections that do not depend on such a radical reductionism.

(2) The theory as it is usually stated claims that images are representational, and assumes that they can represent only in virtue of some similarity. Similarity is, indeed, taken to be both necessary and sufficient for representation. Clearly it is neither. Even if we grant for the moment that we always imagine by means of quasi-pictures, we can see that the theory gives a defective account of what it is for a picture to represent. Representation is a type of reference or denotation.⁹ But no degree of similarity is sufficient to secure this reference. An object closely resembles, but does not represent, a copy of itself. I resemble my mirror image, but I do not represent it. On the other hand, reference may be secured independently of resemblance; we can

⁸ One tactic the physicalist can take against location-objections is to identify not my pain with my brain state, but my having of the pain with my body's being in a certain condition—cf. T. Nagel, "Physicalism," 103–4; see also Place's objections to the "phenomenological fallacy" in "Is Consciousness a Brain Process?" 28 ff. Price's article (cf. n. 6 *supra*) unfortunately assumes that objections based on location and ontological status are the only telling ones that can be brought against images and hence dismisses the difficulties too easily (though not successfully, even on this point).

⁹ I am not, of course, implying that it is like linguistic denotation—that pictures are like words that can be combined to yield a sentence.

make almost anything stand for anything else.¹⁰ A fish may be made to symbolize Christ, a bird in flight the incorporeal Holy Spirit. Similarity is itself a very unclear notion,¹¹ and image theories have not done much to clarify it. But on no understanding of similarity can similarity plausibly be argued to be a necessary feature in such cases of conventional symbolic referring.

The tendency to cling to similarity as at least a necessary condition of representation is bound up with another unexamined assumption: that there is one way of seeing (and painting) the object as it is—an "innocent" view, for fidelity to which all copies or images are to be assessed. The object represents to the extent that it embodies this real, or pure, view.¹² But if we look more deeply into this notion, it seems to be a myth; representing has always been more a matter of interpreting than of reproduc-

¹⁰ A very lucid account of these distinctions is in Goodman's *LA*, especially chapter I, 3–10, and chapter VI, 225–31. Much of my discussion is indebted to his. Another attack on the analysis of representation in terms of similarity is Black's "How do Pictures Represent?" 95–129. Various suggestions about how reference is secured are made by Black, by Wollheim in "Nelson Goodman," and by Walton in "Are Representations Symbols?" See especially the illuminating remarks in Wittgenstein's *Lectures on Religious Belief*, which both undermine the value of similarity as a condition of reference and reveal the magnitude of the difficulty we get into when we try to do without it:

How do I know that a picture is a picture of Lewy?—Normally by its likeness to Lewy, or, under certain circumstances, a picture of Lewy may not be like him, but like Smith. If I give up the business of being like (as a criterion), I get into an awful mess, because anything may be his portrait, given a certain method of projection (III, p. 66).

Lewy makes the promising suggestion that "the connection is a convention"; Wittgenstein urges him to spell this out in terms of learning a rule, a practice. A problem with this suggestion is that we may then be hard put to explain how artists modify our practices by insisting on an unconventional connection, as in the Picasso example below, n. 13.

¹¹ Cf. Goodman's "Seven Strictures," 437–46.

¹² Cf. Goodman, *LA*, 6 ff. Price makes this premise of the theory clear when he urges us to call images either "representative" or "reproductive," as if the two terms were interchangeable (143).

ing. (Goodman's discussion of perspective properly exposes some cherished illusions about the special status of *that* artistic convention.) We can never copy an object in all the ways it is; we are always representing it *as* something. And indeed the interpretation of reality conveyed in a picture can potentially enhance or alter our knowledge of the world. We may see things differently because of an artistic experience. We may develop an ability to see in that picture, in other pictures, in things, structures and relationships of which we had previously been unaware. To the charge that his portrait of Gertrude Stein did not look like her, Picasso is said to have replied, "No matter; it will."¹³

The copy view of pictorial representation and the image view of imagination both, then, embody a seriously defective picture of representation that, in turn, relies on an oddly passive picture of what it is to see. I shall try to show that although Aristotle occasionally and carelessly makes the more superficial error, the most significant contribution of his theory is its attempt to avoid the underlying one.

(3) The Image view strongly implies that if I have an X-image there must be some X in the world to which my image refers: no image has null denotation. This, once again, is a simplistic view of the problem of pictorial reference. When I imagine, what I imagine may not correspond to anything actual; as there are fictional pictures, so there are fictional imaginings, and the question of representation must be given a different analysis accordingly.¹⁴ (It will no doubt be the case that a *causal* account of such fictions will make reference to objects in the world, as interpreted, remembered, combined, etc.,

¹³ Cited by Goodman, *LA*, 33. Cf. n. 10 above. We do not simply reject or fail to understand Picasso's claim that this is a portrait of Stein, although no technique or practice we have so far learned would enable us to see it as such. We do not simply say, Wittgenstein suggests, that it does not belong to the game we know (*Lectures*, 68–69). But it is also true that our ability to see Stein in that picture will be vastly enhanced when and if the new techniques of representation become conventional and part of our learning.

¹⁴ On fictional pictures, see Goodman, *LA*, 21 ff., and also Walton.

by the agent, just as a *causal* account of a Pickwick-picture would mention real activities involved in its production. But this is not to say that the analysis of its status as a representation ought to, or even can, describe it as *denoting* something actual.) This oversight of the image-theorists stems again from their oversimple view of perception: the assimilation of seeing to receiving the object as it is, or receiving an impress of the object. Of course an empiricist proponent of the image view could (as some do) invent a way of dealing with the "problem of fictions," or its relative, the "problem of hallucinations." But, as Dennett has correctly pointed out, the "problem" arises only because of other more basic difficulties with the theory; it need not be a problem at all.¹⁵

(4) We granted above that imagining involved objects that were like pictures and argued that the image theory had a defective account of pictures. But it seems plain that imagining need not involve anything like a picture. The more trivial point is that the image theory persistently ignores auditory, olfactory, and tactile images, and hence has no account of them that would show that they functioned at all like visual picture-images. But there is a more serious point that, again, marks the failure of this theory, so dependent on an aesthetic analogy, to come to grips with what a picture is and how it symbolizes. If imagining is really like looking at a picture, I can keep going back to it as often as I want to discover new information. A picture is informationally dense. It can never be exhaustively described. It is *there*, and without adding anything more to it I can always get more out. Is this really what we want to say about imagining? I think it provides an account that could, at best, serve for a limited range of cases. First, there are many cases of imagining in which the resemblance between the imagining and its object is symbolic, but not representational: i.e., the "picture" is not dense.¹⁶ I might imagine a piece of music by picturing the score,

¹⁵ Dennett, *Content*, 137 ff.

¹⁶ Cf. Goodman, *LA* 225 ff. I am using "represent" in Goodman's restricted sense, "symbolize" or "refer" as more general terms for denotational relationships.

or some books by thinking of their Library of Congress numbers. To imagine Valhalla I might picture a palatial dwelling, but I might equally well think of its Wagnerian *leitmotif*, which denotes or names it. In all these cases the symbolic relationship will be *descriptive*,¹⁷ rather than representational. Furthermore, even in cases of picturing, there is not always anything that corresponds to stepping back and looking at the picture, hence not always the possibility of getting further information. Sartre, Ishiguro, and possibly Wittgenstein¹⁸ go so far as to claim that there is never this possibility: there is never more in imagining that I intentionally put in; it has just the content with which I invest it. Imagining is a lot like sketching, with nothing that corresponds to the moment when the artist steps back to see what it is he has made. This is, I think, very often the case; but the denial that we ever get new or unexpected information out of what we imagine seems excessively rigid. A painter may visualize different compositions in order to discover which one "looks" right to him. If Mozart composed in his head, this does not mean that, unlike an artist who composes at the piano, he simply "wrote" the piece out without "hearing" alternatives and judging, as a hearer does, which was the most appropriate. In short, the Sartre view, while illuminating for a range of cases, is no more appropriate as a general dogma than the view it is intended to supplant. But I suspect that even where imagining does yield new information, the analogy to looking at a picture is seldom perfect: we very rarely are dealing with an object that is both dense and replete. A lot of the imagining will be less

¹⁷ In the first two cases, the relationship will also be notational; in the third, although the syntactic requirements of disjointness and differentiation seem to be satisfied, the requirement of semantic disjointness is not: not all leitmotifs have discrete compliant-classes. Cf. Goodman, *LA*, 151-52, 225-26.

¹⁸ Sartre, 20-21; Ishiguro, 166; Wittgenstein's anecdote about King's College on fire (*Blue Book*, 39) makes a similar point. Cf. also *Lectures*, III, p. 67: "Is thinking of something like painting or shooting at something?" Smythies seems to have held the view attacked here: that a thought is something like an internal picture which we can inspect to see what it is: "Smythies's muddle is based on the idea of a super-picture" (67).

pictorial than diagrammatic (in that some features that would be constitutive in a pictorial scheme are dismissed as being merely contingent);¹⁹ some information that would have had to have been filled in in a picture may be left quite unspecified.²⁰

The image-theory is defective, then, both because it wrongly assimilates all imagining to seeing pictures and because it does not even provide an adequate account of pictorial representation. In addition, it seems to embody a false distinction between copying and interpreting, which explains its neglect throughout of the connection between imagining and our intentions and of the active, interpretive role of the imager. If I have addressed myself to the image theory as a theory of imagination, it should be clear that these objections will also apply, with suitable adjustment, to a more general theory of perceptual awareness that relies centrally on images. And even someone who was not moved by such objections to discard the image theory of imagination might find them telling against a theory that invoked images to explain thinking or perceiving. But, granted my emphasis so far on the diversity of the phenomena and the dangers of an overambitious unitary account, is there any one place we can begin? And does Aristotle give us any help in finding a beginning?

I think he does. But it may be useful first to start in a rather backhand way and look for a way of beginning with Aristotle, since I intend to argue that most previous interpreters have begun in the wrong place. Wittgenstein and others, as a result of their dissatisfactions with the image view, went on to use the general notion of "seeing as" or "seeing an aspect" to elucidate imagining and related phenomena.²¹ (Wittgenstein seems to claim only that the logic of the two concepts is similar; Ishiguro takes the further step of suggesting that imagination should be viewed as a sort of "seeing-as.") Such investigations seem to

¹⁹ On repleteness and density, cf. Goodman, *LA*, 229–30.

²⁰ Cf. Dennett's remarks on the puzzle of the dream-tiger with countable stripes, 136 ff.

²¹ Wittgenstein, *PI*, II.xi; Ishiguro, especially 176–78.

provide a promising avenue of approach to Aristotle's theory. For what *phainetai* F to someone is, after all, what is seen by him as F. His *phainomenon agathon* is his view of the good.²² The *phainomena* are things in the world as seen (and reported) by human observers. This broad interest in how things appear to sentient beings seems to form the basis for Aristotle's more specialized discussions of envisaging and of the sort of awareness that leads to action, much as, in Ishiguro's account, the concept of "seeing-as" is basic to the elucidation of the more specialized concepts of imagining and picturing.²³

It will be argued, on the basis of a survey of the uses of *phantasia* and *phantasma* both before Aristotle and in his work, that the most fruitful approach in determining what is meant in any given context is always to remain aware of the connection with the verb *phainesthai* and to find images only where there is concrete evidence of their presence. We should not assume lightly that Aristotle is producing a bad theory based on a technical usage rather than a subtler theory more closely tied to ordinary usage. There will be some passages where Aristotle does refer to picture-like "internal objects;" some where he merely invokes episodes of envisaging; some where his interest in the faculty of *phantasia* is the still more general one of how it is that one sees X as F, or ascribes some content to the object of one's actual perception. We can decide what is in view only by understanding what questions, in each case, Aristotle is asking. After surveying the variety of questions *phantasia* is invoked to answer, we will be in a better position to appreciate its role in the accounts of action in *MA* 6 ff. and *DA* III.9–11 and the contribution of these accounts to Aristotle's psychology. But first let us sketch the problems of interpretation with which these accounts confront us.

²² Cf. especially *EN* III.4–5. There is an illuminating discussion of these chapters and their importance for Aristotle's account of intentional action in Furley's "Self Movers."

²³ Aristotles' *phainesthai* seems to be a broader notion than "seeing-as" (especially as discussed by Wittgenstein), and the comparison will not prove equally illuminating in all contexts.

PHANTASIA IN THE ACCOUNTS OF ACTION

At the end of the third book of the *De Anima* and in chapters 6–8 of the *De Motu Animalium*, Aristotle tries to determine what faculties we must ascribe to animals in order to be able to explain why and how they move towards their goals. In these contexts, more explicitly than in any others, he gives a central place to the faculty of *phantasia*, claiming that it functions even when actual perceiving and/or thinking are going on. The sixth chapter of the *MA* begins by listing *phantasia* as one of the faculties that should be mentioned in an explanation of animal motion (700^b17 ff.). Among these there are two major sub-groups: kinds of desiring and kinds of discerning or apprehending.²⁴ *Phantasia*, along with *aisthēsis* and *nous* (or *dianoia*), is a member of this second group, the “distinction-making faculties” (*kritika*), which seem to do two jobs in connection with action: they present to the animal some object of desire and they present the concrete situation as an example of what is or is not desired. It appears from the sketchy account in chapter 6 that any one of the three *kritika* can operate without the other two, and in combination with some sort of *orexis*, to produce action. *Phantasia* and *aisthēsis* are said to “hold the same place” as *noēsis* in a scientific explanation. As far as we are told, the combinations desire + sense perception and desire + thinking would be sufficient to “move” the animal, without any involvement of *phantasia*.

Two subsequent passages suggest the same picture: (1) 701^a29: “For whenever a creature is actually using sense-perception or *phantasia* or thought towards the thing for-the-sake-of-which . . .”; (2) 701^a32: “‘Here’s drink,’ says sense-perception or *phantasia* or thought.” Both passages offer a straightforward disjunction of faculties. In the first, any one of the three can present the object of desire. In the second, any one of the three can offer the information about the concrete

²⁴ This distinction cuts across the Platonic “rational-irrational” distinction (criticized by Aristotle in *DA* III.9) and prepares the way for a unitary account of all animal activity.

situation that constitutes the minor premise of a practical syllogism. Both of these passages occur in the discussion of the syllogism, where Aristotle is concerned to show how cognition and desire must be combined in order for action to result, less concerned to analyze the interrelationships of the various cognitive faculties.

But further on in the same discussion, when offering a more careful and schematic account of the steps that lead to action, Aristotle gives *phantasia* a broader role:

For the affections suitably prepare the organic parts, desire the affections, and *phantasia* the desire; and *phantasia* comes about either through thought or through sense-perception (702^a18 ff.).

Phantasia, then, is involved in every action; it must “prepare” the desire whether or not actual perceiving is going on.²⁵ It is said to have two sources: sense-perception or thinking. It looks as though its job is to present the perceived or thought object to the creature in such a way that it can be moved to act. Similar statements are made in the *DA*’s parallel account. At 432^b15, motion is said to be “always with both *phantasia* and desire;”²⁶ at 433^b26–30, Aristotle writes: “Insofar as an animal has the capacity to desire, thus far it is a self-mover; but it cannot desire without *phantasia*. All *phantasia* is connected either with

²⁵ Cf. also 701^b33–35, where the heating or chilling is said to follow, of necessity, the “thought or *phantasia*” of the object of pursuit or avoidance. The omission of *aisthēsis* might be just careless. But it might also be that *aisthēsis* alone is insufficient to present the object of pursuit or avoidance to the animal in such a way that desire becomes active and action follows. *Aisthēsis* was also omitted from the original list of “movers of the animal” (700^b18), although it was included in the list of cognitive faculties that immediately followed.

²⁶ All manuscripts read $\bar{\epsilon}$ rather than *kai* before *orexōs*, but the reading *kai* is attested in Themistius (whose authority at least equals that of the manuscripts) and is confirmed by what follows. *kai* is accepted by Ross in both his edition-commentary and his OCT. Even if we read $\bar{\epsilon}$, we still find that *phantasia* is the only cognitive faculty that is mentioned as necessary for motion, and we are told at 433^a20 that when *phantasia* imparts motion it does not do so without *orexis*.

thinking or with perception." This echoes the two main claims of the *De Motu* account: that *phantasia* is necessary for the operations of desire and that it is of two types: the type connected with thinking (the *logistikē*) and the type connected with *aisthēsis*. In the following chapter (III.11), Aristotle discusses a class of lower animals that he calls "the incomplete creatures," asking how it is that they can move. To answer this question he must pose two others: "Do they have desire?" and "Do they have *phantasia*?" The answer to the first is that they evidently have *epithumia*, which is a species of desire. Aristotle never doubts that they have *aisthēsis*—this is, after all, his criterion for calling something an animal in the first place. But it would apparently be insufficient to claim that they move in virtue of their possession of *aisthēsis* and of *epithumia*. Aristotle rather grudgingly admits that, undeveloped as they are, they have some vague sort of *phantasia*, since they do, in fact, move. The chapter concludes with a recapitulation of the distinction between the two species of *phantasia*: the one peculiar to rational creatures is now called the deliberative (*bouleutikē*) and Aristotle gives an example of its functioning (433^b31–434^a10—cf. pp. 263–65).

We have had so far a number of mysterious hints about the connection between *phantasia* and sense-perception; there is another passage of the *DA* that appears more peculiar still, but that eventually may help us to clarify the picture. At 432^a31, he says that the being (the *einai*) of *phantasia* is different from the being of any other faculty, but that *phantasia* might still be "the same as" some other faculty. In the *De Insomniis* (459^a15) he tells us that it is "the same as" the faculty of *aisthēsis*, but different from that faculty in its *einai*. It is hard to know what Aristotle means when he says two faculties are "the same;" for one thing, he is not very careful to tell us "the same what."²⁷ Even if we assume he means "the same faculty" or "capacity" (as he explicitly says in the similar passage, *EN* 1141^b23; and cf. 1130^a11), it remains unclear whether his meaning is that these are names for two different ranges of activity

²⁷ On this see White, "Aristotle on Sameness," and Wiggins, *ISTC*, 1–2, 27.

of a general cognitive power (regarded as a single power because neither range is found in creatures that lack the other, and both require the same bodily apparatus to get going), or whether the linkage is tighter still: an activity of this power can be regarded as an exercise of either the *phantasia*-capacity or the *aisthēsis*-capacity, depending on the aspect to which we direct our attention. Aristotle's use of the terms *phantastikon* and *aisthētikon* rather than *phantasia* and *aisthēsis* support the second reading: he says not that two activities are based on a single capacity but that two capacities are the same, implying that activities traceable to the one could also, under some description, be traced to the other. Further support for the "two-description" reading can be derived from a number of other passages in which Aristotle speaks of difference in *einai*: *Metaph.* XI.10, 1066^a33, where the road up and the road down are said to be one, but different in *einai*; similar remarks at *DA* 424^a25 and 425^b25 about the actuality of *aisthēsis* and of its object; and *Mem.* 450^b21, where it is claimed that we can regard the painted animal either as a likeness or as an animal ("but the *einai* is not the same for both"). And *EN* V, 1130^a12 tells us that *aretē* is the name of the virtuous disposition *simpliciter*, *dikaiousunē* its name in its aspect of relating to other human beings. This seems to suggest not that there are some activities of the disposition that are other-directed and some which are not, but rather that *qua* other-directed they have a different name and a different description.²⁸

We can, then, reasonably infer several things from Aristotle's statement that the *aisthētikon* and the *phantastikon* are

²⁸ Two passages that might be used to support a "separate-activities" interpretation do not tell either way. At *EN* 1141^b23 ff., the statement that *politikē* and *phronēsis* are "the same disposition" (*hē autē hexis*) but not the same in *einai* is often interpreted to mean that *politikē* is practical wisdom concerning one's dealings with other men, *phronēsis* practical wisdom concerning the realization of one's own good. But read in the context of the chapter as a whole it seems to indicate, instead, just that *phronēsis* and *politikē* are the same virtue seen from different points of view, *phronēsis* being the general name of the disposition, *politikē* its name when we focus on its public consequences. The private and the public life of the good citizen can be distinguished only logically. (Cf. Stewart's commentary

"the same" capacity, but "different in *einai*": (1) All creatures that are capable of perceiving are capable of *phantasia*; the same physiological apparatus that is sufficient for one is sufficient also for the other. (2) Many activities of the *aisthētikōn* can also be viewed, in some other way, as activities of the *phantastikōn*. (To conclude that *all* its activities have these two aspects would be a stronger claim than Aristotle's other arguments could support.) (3) There is some good reason for using both terms, some new information gained by noticing both aspects of the disposition and its activities. We still cannot be sure whether the *aisthētikōn* and the *phantastikōn* (where they are "the same") are related more as the road up and the road down, or as the road *simpliciter* and the road down (i.e., the relation that exists between *aretē* and *dikaiosunē*).

There is little other evidence to support (1). *DA* III.11 seemed at least to entertain the possibility that imperfect creatures might have the sense of touch without *phantasia*. At *DA* 428^a10 ff., Aristotle granted *phantasia* to the bee and the ant, but tentatively denied it to the worm. His *dokei d'ou* in that passage expressed uncertainty, and III.11 may be seen as a resolution of the question in favor of granting it to all self-movers. At 415^a10 ff., Aristotle says that of the perishable beings (*phtharta*) who lack reason, some do not even have *phantasia* and some live by that alone. But *phtharta* may well include plants, so the statement cannot be taken as evidence that Aristotle believed there are animals that lack *phantasia*. Another potentially informative passage, *DA* II.2, 413^b21 ff., is too obscure to be decisive; on the most likely reading, it indicates that *phantasia* and *aisthēsis* are indeed coextensive, but

for a longer defence of this view.) In *Metaph.* XII (1075^b2 ff.), the statement that Empedocles' *Philia* is both a material and an efficient cause, but that the *einai* in these two cases is not the same, seems indeed to suggest two distinct spheres of operation for the same figure. But, in fact, there is only one process of formation going on. To borrow an image suggested by Zeph Stewart, we are probably meant to think of *Philia* as something like the yeast in dough: both a constituent and an efficient cause (raising agent) of the bread.

that *phantasia* has some particular connection with apprehending the object of desire.²⁹

We must now turn to the evidence for the connection of *phantasia* with thinking that substantiates the broad claims of *MA* 8 and *DA* III.10 that all animal motion involves *phantasia*. In I.1 of the *DA*, Aristotle makes the claim that most affections of the soul are "not without" the body: "for the body is affected in some way together with these" (403^a3 ff.). Thinking, it is said, seems to be an activity peculiar to the soul: but if this is some sort of *phantasia*, or not without *phantasia*, it will not be without body (403^a8–10). In the *MA*, four passages that suggest a close connection between *phantasia* and thinking are all in contexts where Aristotle is talking about the physiological changes that necessarily accompany psychic processes. At 701^a5–7 Aristotle tells us that the bodily alteration that leads to motion of the limbs is associated with some activity of either *aisthēsis* or *phantasia*; the omission of *noēsis* might be simply careless, but it may also point to the view expressed by Aristotle in *DA* III.7–8 (cf. pp. 238–40) that all thinking requires *phantasmata*. For there is a problem for Aristotle in

²⁹ Discussing the faculties of insects that have been bisected, Aristotle writes: "Both segments have sense-perception and local motion; if sense-perception, then *phantasia* and desire (*ei d'aisthēsin kai phantasia kai orexin*). For where there is sense-perception, there are also both pain and pleasure; and where these are, there is necessarily appetite." The sentence in parentheses, differently punctuated, might yield the sense, "If sense-perception and *phantasia*, then desire." But the subsequent sentence makes *aisthēsis* a sufficient condition for desire. If we are not told that *phantasia* and *aisthēsis* are coextensive, we cannot know that *phantasia* is a necessary condition for *orexis*. The punctuation I have chosen, however, leaves *phantasia*'s role in the argument unclear: Aristotle goes on to give reasons for the claim, "If *aisthēsis*, then *orexis*," but does nothing analogous for *phantasia*. Perhaps his silence indicates only that he is relying on statements elsewhere about the relationship between *phantasia* and *aisthēsis*. Perhaps, however, the remarks about pleasure, pain, and appetite tend to show, as well, reasons for the ascription of *phantasia* to all sentient creatures: that is, *phantasia* has a particular connection with one's awareness of the object of desire. This is consistent with the evidence of *DA* III.7 and 10 and of *MA* 701^b33–35.

setting out the physiological side of his account: he wants to say that for every psychic activity there is some physiological realization.³⁰ But what will he say about *nous*? If *nous* is separable from body, its activities should certainly not be describable as, or even necessarily correlated with, physiological processes. The solution to which Aristotle seems, for various reasons (which we shall examine in more detail later), to incline is that in a living body the activities of *nous* must be linked with those of the faculty of *phantasia*, which it would not be implausible to see as realized in some physiological occurrences. 701^a34–36 and 703^b18 again link *noēsis* and *phantasia* in an account of physiological alterations; 701^b17 ff. argues that although the physiological side of *aisthēsis* is more immediately apparent than that of the other two cognitive faculties, we see as well that mere thinking, without actual perception, can result in motion; hence we must conclude that *noēsis* and *phantasia* are also associated with physiological change.³¹ The passage implies that it is *noēsis* and *phantasia* together that have “the power of the actual things” (701^b18–19). Only thinking is subsequently discussed (701^b20–22); so if the introduction of *phantasia* is not otiose we are, perhaps, to see that the thinking that results in motion does so just because *phantasia*, which accompanies it, has these physiological associations.

In passages where he is preoccupied with the physiology of action, then, Aristotle implies that the *noēsis* that leads to action must be accompanied by *phantasia*. The *DA* makes this connection very plain: we will conclude thinking is “not without body” only if we find it is either a type of *phantasia* or not without *phantasia*.

The connection is explored further in *DA* III.7, in a discussion of how the object of desire is presented to the animal. Aristotle does not consider the possibility (mentioned in I.1) that thinking is a type of *phantasia*; presumably this is to be

³⁰ Cf. Essays 1 and 3.

³¹ I am taking *noēsantes monon* here to mean not “thinking without desire,” but “thinking (and the accompanying desiring) without actual perception” —cf. Essay 3, n. 14.

taken as ruled out by the analyses of III.3–5. But he does conclude that thinking (or at least the thinking preceding action) is “not without *phantasia*”:

To the thinking soul, *phantasmata* serve as *aisthēmata*; and when it asserts or denies good or bad, it avoids or pursues it. Hence the soul never thinks without a *phantasma* (431^a14–17).

Phantasmata, and not *aisthēmata*, provide data for the operations of practical reasoning and are said, in fact, to accompany every act of thinking. At 431^b2 ff., Aristotle continues:

The thinking creature,³² therefore, thinks the forms in the *phantasmata*; and, since in these what is to be pursued and avoided is determined for it, it can be moved even without actual perception, when it is concerned with *phantasmata*.³³

Phantasia (as in *MA* 701^b17 ff.) is invoked to explain how it is that the mere thought of some object, in the absence of actual perception, can suffice to cause motion. This does not, of course, imply that it is only in the absence of actual *aisthēsis* that *phantasia* plays this important role; the preceding passage had implied the contrary. But it is there that its connection with thinking becomes particularly obvious. Once again, thinking is linked to *phantasia* in order to explain how animals are moved; *phantasia*, as in the *MA*, is said to present the noetic faculty with a “form” (*eidos*) of its object, “determined” as an object of pursuit or avoidance. Exactly what this “form” contributes to thinking, and why it is required, is not made explicit.

Aristotle has, then, made in III.7 a very general claim about the necessity that acts of thinking be connected with some activity of *phantasia*. But the claim was made within the context of a discussion of motivation and might be read as applicable

³² Hamlyn, in his commentary on this passage, argues persuasively that *to noētikon* must be the creature, since it is the subject of the verb of motion.

³³ Cf. Rodier's translation and his note on the translation of the *hōs* clause.

only in action contexts. III.8 makes a similar claim about all thinking:

Since there is nothing that has separate existence, it seems, apart from perceptible magnitudes, the objects of thought are in the perceptible forms, . . . and for this reason unless one perceived things one would not learn or understand anything; and when one reflects, one must reflect simultaneously with a *phantasma*.³⁴ For *phantasmata* are like *aisthēmata*, only without matter (432^a3–10).

For thinking it is necessary not just that one have had some sense-experience (cf. also the claims of *APo* I.18), but that one have, simultaneously with the thought, some awareness of the sense-experience, in the form of a *phantasma*. The faculty of *aisthēsis* cannot, alone, suffice to provide the necessary conditions for thinking. It is the *phantasma* and *phantasia* that must be mentioned.

The data of the *MA* and of *DA* III have yielded some tentative conclusions and some difficult questions. Aristotle reveals a particular interest in the role played by *phantasia* in action; in these contexts more explicitly than anywhere else he tends to give it an "umbrella" role, claiming that it functions even in cases where actual perceiving and/or thinking are going on. It is closely linked to the operations of desire and somehow presents the object of desire to the animal in such a way that it can be moved to action. Aristotle hesitates to ascribe *phantasia* to less complex creatures, but concludes that it must belong at least to all which are self-moving. Although he occasionally (e.g., in the "drink" syllogism in *MA* 7) suggests that perception or thought alone could operate with desire to produce action, his considered view seems to be that an extra factor must be mentioned in the account of motion and that there is a single faculty (or a special aspect of the faculty of perception)

³⁴ So ET^p, accepted by Bichl, Rodier, and Hicks. CLUP^pSp and Ross have *phantasma ti*.

in virtue of which an animal becomes aware of its object of desire, whether that object is initially presented *via* the senses or by thought. Furthermore, even theoretical thinking must, it seems, go on concurrently with some activity of *phantasia*. We need to determine now why Aristotle thought perception and thought needed this *phantasia*, why it should be supposed that there is a single faculty at work in such diverse cases, and what its contribution is. What is there about *aisthēsis* and the *aisthēma* it presents that makes this extra element necessary for the explanation of action? How does *phantasia* help Aristotle explain thinking? What is the *eidos* that *phantasia* presents and how is that different from what *aisthēsis* presents? In order to arrive at even a conjectural solution to these problems, we must first look more closely at the terms *phantasia* and *phantasma*, deliberately left untranslated in this discussion. By examining the use of these words in pre-Aristotelian and other Aristotelian contexts, we will try to determine how far and in what contexts mental images should be invoked to explain *phantasia* and where it is more illuminating to insist on the general connection with *phainetai*.

THE USE AND RANGE OF PHANTASIA

The pre-Aristotelian use of *phantasia* and related words³⁵ follows a pattern to which Aristotle's own usage seems to have remained generally faithful. Beginning with the earliest attested usages there is a tendency to employ *phantasma* and the verb *phantazesthai* in talking of dreams, memories, and hallucinations, sometimes with a strong implication that what is so characterized is some sort of representative image. But these words are not the only or even the most popular ones in such contexts (more common are words like *eikōn*, *eidōlon*, and *enupnion*). The *phantasia*-words far more frequently retain their general connection with the whole range of usage of the verb *phainesthai*.

³⁵ For discussion of some of the Platonic material, see Rees, 492–93.

The word *phantasia* is, of course, not common before Aristotle;³⁶ but *phantasma* and *phantazesthai* occur frequently in a distribution that has interesting implications. For it is generally conceded that Aristotle often uses *phantasia* in ways that have nothing to do with images and imaging. The proponents of a mental-image view of Aristotelian *phantasia* must lean heavily on the words *phantasma* and *phantazesthai*, claiming that these always indicate that mental images are in question.³⁷ The early evidence shows, however, that *phantasma* often functions simply as the verbal noun of *phainesthai* and means, in a most general way, "what appears." Thus the "*phainomena*, but not *onta*" ("what appears, but is not") of *Republic* 596 e is picked up by "*phantasmata*, but not *onta*" at 599 a. At 598 a-b the *phantasma* is what appears, as *alētheia* is what is. The representative image made by the imitator (*mimētēs*) who takes as his model not what is, but what appears (*to phainomenon*) is called not a *phantasma*, but a phantom or shadow-image (*eidōlon*, 601 b). *Phantasma* is again used in the general sense of "appearance" or "what appears" at *Parmenides* 166 a 4: "There is no *doxa* of what is not among the others, nor any *phantasma*." Further on in this passage, *doxa* is to *doxazetai* as *phantasma* is to *phainetai*, and the same point that is made in the *phantasma* passage is recapitulated at 166 b 6-7 using *phainomena* and *phainetai*. The close connection with *phainetai* is evident also in *Theaetetus* 152 b-c, one of the earliest uses of the word *phantasia*: "Is this 'it appears' ('*phainetai*') perceiving? . . . Then *phantasia* and perception are the same in the case of that which is warm and everything of that sort." And in the *Sophist* (235 d 6 ff.) the contrast between the *eikastikē technē*, which makes an accurate likeness, and the *phantastikē*, which makes what *seems* to the deficient observer to be an accurate likeness, depends not on any theory

³⁶ For two Platonic passages, cf. *infra* and p. 244. I have chosen not to discuss the more theoretical elaboration at *Soph.* 264 b since it would require lengthy discussion and seems less useful in determining the ordinary usage of the word-group. Plato's theory is given an interesting discussion in Lycos's "Aristotle and Plato on 'Appearing'."

³⁷ This is the usual practice of the commentators cited in n. 2 above.

of imaging, but on a general interest in how things appear; *phantasma* is, once again, the noun associated with *phainetai* (236 b 4 ff.):

What shall we call that which appears, because it is seen from a bad angle, to be like the beautiful, but which would not be likely even to resemble what it claims to be like, if we could see things of that size adequately? Since it appears (*phainetai*), but is not like (*eoike d'ou*), shall we not call it a *phantasma*?

The *eikōn*, or likeness, is contrasted implicitly with the *phantasma*, which creates a certain impression, but is not really similar. The verb *phantazesthai* is used in a sense roughly equivalent to the simple *phainetai* at *Philebus* 38 c 12 ("What is this thing that appears (*phantazomenon*), standing beside the rock under a tree?"). And at *Symposium* 211 a 5 ff., it is used to describe non-sensory, as well as sensory, appearing:

The beautiful will appear to him (*phantasthēsetai*) not as a face, or hands, appear, or anything else that partakes in body, nor as an argument appears, or a piece of knowledge, . . . but itself by itself, eternally unitary in form.³⁸

In much of the pre-Aristotelian evidence, then, *phantasma*, *phantazesthai*, and the new word *phantasia* are used simply as

³⁸ It is true that the form is described as something "seen" earlier in the passage (*katopsetai*, 210 e 4), so the use of *phantazesthai* with the form would not by itself show it is non-sensory. But there is here an explicit contrast with the way perceptible objects "appear," even with the way an argument or some scientific knowledge "appears" (and here *phantazesthai* must surely be non-sensory). I would see the sentence as a warning against inferring from the metaphorical use of *katopsetai* above that the form is really apprehended by some quasi-sensory process. Zeph Stewart has suggested to me that *phantazesthai* is probably used in this and the *Philebus* passage to avoid any ambiguity as to whether the presentation is a delusion ("seems to be under the tree, but isn't," "seems to be beautiful, but isn't"); the verb emphasizes the reliability of the presentation.

relatives of *phainetai*: their presence does not imply that any theory of imaging, or indeed any other particular theory, is in question. There are, however, other passages where a more specific interest in imagining and dreaming is evident. Hippias Major (300 c) and *Philebus* (51 a) use *phantazesthai* of imagining, though without indicating a particular interest in images; and numerous passages use *phantasma*, or *phantazesthai*, to speak of apparitions (e.g., *Aes. Ag.* 1500; *Pl. Phd.* 81 d, *Rep.* 380 d, 382 e—the earliest known use of *phantasia*), and particularly dream-appearances (*Aes. Septem* 710, fr. 312; *Eur. Hec.* 54, 94, 390; *Hdt.* 4.124; *Pl. Soph.* 266). *Phantasma*, in such passages, need not designate a representative image, but it is easy to see that a popular theory about these occurrences might take some such form. On the other hand, *phantasma* has not been appropriated as the primary technical term to describe such phenomena. For example, the decaying-sense account of memory in *Philebus* 34 a–b makes no use of *phantasia* or its cognates, relying instead on words such as *kinēsis* and *sōtēria aisthēseōs* to describe the memory trace.

In general we can say that while words that mean “appearing” and “what appears” tend to be useful in an ordinary discussion of dreams and hallucinations, and while the context may in some of these cases indicate that the author believes that what appears or is presented is an image, it is equally common to find different analyses of the matter—e.g., in *Rep.* 380 d, where we are told not that an image of the god appears, but that the god himself appears in a changed form. Furthermore, in no case should we assume that *phantasma* means “image.” Its meaning is “what appears,” and context must determine its usage. Even if it were established that the vast majority of English-speakers believe we think by means of images, that would hardly show that English “think” means anything like “have an image.” I think it will emerge that Aristotle, though he goes further than his predecessor towards investing these words with a specific technical sense, bases his investigations on the connection with *phainetai*.

Often when Aristotle uses *phantasia* and related words, the

context makes no reference to imaging, and the words serve in a very general way to indicate Aristotle's interest in the way a scene looks to the living creature, what his awareness of it is, what he perceives it *as*. The following passages indicate how closely *phantasia* remains linked to *phainetai*, even in what, in the last example, seems to be a “technical” context:

EN 1114^a32ff.: All men strive for the apparent good (*phainomenon agathon*): but no one is in control of the appearing (*phantasia*): the way the end appears (*phainetai*) to someone depends on what sort of a man he is.

EE 1235^b25–29: Pleasure is desired, for it is an apparent good (*phainomenon agathon*). Some believe it is good; but to some it appears (*phainetai*) good, even if they do not believe it to be so—for *phantasia* and *doxa* are not in the same part of the soul.

Insomn. 460^b19: The sun appears (*phainetai*) a foot wide; but often something else opposes this *phantasia*.³⁹

All these passages discuss the various ways something may appear to, or be interpreted by, a living creature. The second and third make an additional contrast between the way the thing appears to the agent and the belief he has about it. A *phantasia* would seem to be a single, isolated impression, in contrast to *doxa*, which is based on experience and reflection. Thus *EN* VII (1147^b4 ff.) draws a contrast between following the *phantasia* of particulars and following a general belief. The *Insomn.* passage, though characteristically interpreted with reference to images, is quite comprehensible without them; it seems very similar to the *EE* statement. In both cases something in the world may appear a certain way to a creature, even while he holds an opposing belief about its nature.

Once again, at the opening of the *DA*, Aristotle uses *phantasia* in an unmistakeably broad sense:

³⁹ Cf. Bonitz *Index*, s.v. *phantasia* for a number of similar passages.

When we are able to give an account of the incidental attributes as they appear to us (*kata tēn phantasia*), . . . then we will also be best qualified to speak about the *ousia* (402^b22–24).

There is no obvious reason to separate such passages from others, as does Bonitz, finding different “senses” in question. *Phantasia* for Aristotle seems to be as wide-ranging a notion as the notion of the *phainomena*—which, as Owen has argued, embraces far more than the data of perception.⁴⁰ His interest is in how an object or state of affairs registers with the creature, what content it has for him.⁴¹ If this is so, we will expect that for Aristotle to talk of a sensory *phantasia* would be to ascribe some (potentially motivating) content to the animal’s perception, and that the animal who “phantasizes” will not just perceive an object, but perceive it *as* a thing of a certain sort, a thing that could become for him an object either of pursuit or of avoidance. Like Wittgenstein, he would be interested in the experience of “seeing as,” though, unlike Wittgenstein, who speaks of an “echo of thought in sight,”⁴² Aristotle seems to be concerned with the way in which all moving creatures, most of whom lack thought and experience, become aware of objects in such a way as to be moved. The role of *phantasia* in the *MA* and in *DA* III.9–11 could, it seems, be explained with reference only to this very general interest in appearing, without importing images. To decide whether this sort of interpretation is correct will require the scrutiny of further evidence. But first we must assess the image theory itself.

One might grant that the notion of “seeing as” is basic to Aristotle’s interest in *phantasia* and still claim that, as he develops a theory based on this notion to explain various epistemological problems, he immediately imports images, so that there

⁴⁰ Owen, “*Tithenai*.”

⁴¹ He seems to be animated by many of the same concerns as, for example, Dennett (*Content*) in his talk of the way in which a creature is aware of an object—cf. especially chapter IV.

⁴² Wittgenstein, *PI*, II.xi.

are no passages in which he works out his basic insight about awareness in an equally flexible and interesting way. His analysis of the problems of delusion, dreaming, and memory cannot be analyzed here in any detail, but a few examples will show that in some of these contexts it requires distortion to find images at all, while in obvious image-contexts *phantasia* and its cognates are not the words most commonly used. Aristotle’s interest in the “truth” and “falsehood” of appearances, often said to be linked to a dogmatic image theory, is evident in passages where images are not in question, in general talk about the way a state of affairs or a person is typically seen by others:

Metaph. V.29, 1024^b24–26: Things are called false either because they themselves are not or because the *phantasia* that results from them is of what is not.

Shadow-pictures (*skiagraphia*) and dream-images (*enupnia*)—the examples that follow—are distinguished from the *phantasia* that results from them. *Phantasia mē ontos* should be taken not as “a dream image of what is not” (he is speaking of all dreams, not just dreams about non-existent things or situations), but as the false impression that results from the dream. Whatever these *enupnia* are—images, physical states, etc.—the point is that they give us a false impression of reality. “They are something,” says Aristotle (1024^b23), “but not what they give the impression of being (*hōn empoiei tēn phantasia*),” not what we see them as. We take the shadow picture for an animal, a dream situation for a real one.

Even clearer is 1025^a5 ff. A man, Aristotle observes, can be called “false” if he often gives others a false impression, “just as we call states of affairs false if they create a false *phantasia*.” To read mental pictures into this passage we would have to say that what a hypocrite does (for the context indicates that hypocrisy, and not susceptibility to being misunderstood, is in question) is to paint in others’ minds a picture of a smiling Dorian Gray, while all the while he is really terribly ugly from vice. Certainly Aristotle could not have believed that the

moral qualities of a man standardly present themselves in a pictorial form and that to appraise someone's character falsely is to be shown picture X for picture Y. (And how could the decaying-sense account of the *PN* even explain the production of this misleading picture by the hypocrite?) The *phantasia* is just our interpretation of the data presented to us. It is an activity that may go wrong, and a clever hypocrite can delude us in words and deeds, so that he appears to us to be what he is not.⁴³ But no simple mechanism of images or traces in the soul can explain all the complex range of phenomena Aristotle studies under the rubric of *phantasia*.⁴⁴

In a number of other passages where *phantasia* is invoked to explain delusion and dreaming, images are not precluded, but the context makes it unlikely that they are in question. Such is the passage already cited from the *Insomm.*, paralleled by *DA* 428^b2–4:

Things can also have a false appearance (*phainetai pseudē*), concerning which we have a true opinion: e.g., the sun appears (*phainetai*) a foot wide, but we are convinced it is larger than the inhabited world.

To say the sun appears a foot across is not to claim that when we look at the sun we must have before us a mental picture that

⁴³ Strictly Aristotle ought to have said not that the *phantasia* is false, but that the information it presents (which can be expressed propositionally) is false. Some people may "phantasize" propositionally, but surely many will not. Aristotle often uses "false" in the loose sense of "inaccurate"—but strictly he denies truth-value to the non-composite (e.g., *Metaph.* 1051^b17 ff., *DA* 430^a26 ff.).

⁴⁴ The *Rhet.* cites a number of similar examples where *phantasia* must mean, generally, "appearance" or "impression." For example, at 1370^b32, "Victory is pleasant . . . because one has the impression (*phantasia*) of superiority"—one sees oneself as superior. At 1371^a19: "Being-loved is pleasant because one gets the impression (*phantasia*) one is really a good sort of person (*tou huparchein autōi to agathon einai*)."⁴⁵ Although Aristotle himself in this popular and probably early work invokes decaying sense to explain what *phantasia* is (1370^a28), that account does not fit his own usage of the word in these passages.

is a foot wide—or even a picture that we somehow internally measure and find to be a foot wide. There is no evidence that Aristotle wanted to make such an unilluminating claim. The person's *phantasia* has as its object the sun itself, and *phantasia* is his activity of seeing it as an object of a certain size. Judgment also has the real sun for its object, but, unlike *phantasia*, it requires experience and induction. It would be hard to find in this passage even the notion that the activity of *phantasia* necessarily involves episodes of picturing. All that need be added to the basic sense-experience is some interpretation of what is seen.

When Aristotle attempts to give a detailed explanation of memory and dreaming, he does indeed invoke images. Memory and dreaming are explained not as special sorts of awareness of an actual object or state of affairs, but as the having of an image that is like something in the world and (in the case of memory) is regarded as a likeness. Though images might be invoked to explain these phenomena quite independently of any physiological theory concerning their production, Aristotle invokes images only in connection with the working out of his physiological theory of decaying sense; and it seems to be the exigencies of this theory, rather than any aspect of his psychological doctrine, that lead him to postulate these images. Actual perception sets up certain motions (*kinēseis*) in the living creature, which persist in the absence of the object (*DA* III.3, 429^a1–2, on which cf. p. 251). Similar *kinēseis*, in connection with the theory of dreaming, are likened to cloud forms that look now like men, now like centaurs. Each is said to be the residual trace of an actual *aisthēma*; the image resembles Coriscus, although it is not Coriscus (*Insomm.* 461^b29 ff.). Even more clearly, the theory of memory stresses that the *kinēsis* acts like a signet-ring, making an impression of the *aisthēma*. It is important to note that, although the definition of memory at *Mem.* 451^a15–16 uses the word *phantasma* to designate the memory-image (so that it seems to correspond to the "painting" (*zōgraphēma*) of 450^a29–30), the two expository passages just cited use neither *phantasia* nor *phantasma*. It is with reference to *aisthēmata*, not *phantasmata*, that he discusses perceptual after-

images (460^b2–3). To say the *phantasma* is had as a likeness (451^a15) is to suggest that *phantasmata* are not always likenesses. And elsewhere in the *PN*, a more general use of the words is attested (e.g., 460^b16–18, where *phantasia* explains actual perceptual mistakes, and *Mem.* 449^b30 ff., which reaffirms the sweeping claims of *DA* III. 7–8).⁴⁵ Aristotle, in the *PN*, advances the theoretical claim that *phantasia* works, in at least some cases, by means of images: that a *phantasma* can be like a picture. But he hardly seems to be giving “image” as the meaning of *phantasma*, any more than an empiricist might be said to use “think” with the meaning “have an image.” No theoretical weight attaches to the word itself, and context must determine its usage.

If Aristotle's theory of memory here does depend rather heavily on resemblance as criterion of symbolization, it still may not fully amount to the image-theory as I have described it. (1) The assimilation of memory to picture-seeing may be metaphorical, at least in part: for 450^b25 ff. states that the “image,” regarded in isolation from what it denotes, is either a *theorēma* or a *phantasma*; the former is most unlikely to be pictorial. At 451^a1, a thought (*noēma*) is contrasted with a *mnēmoneuma*—a thought regarded as a likeness. Aristotle seems to admit here that memory may not always work through quasi-pictures, but might consist in regarding a non-pictorial thought as referring to something in the past. (2) There is, in any case, no implication that the image has the informational density of a picture, or that, in addition to what we initially “see” in it, we can keep on going back to find new information. Nor is anything implied about the definiteness of the image.

⁴⁵ Cf. also the obscure passage in the *Insomn.* (458^b15 ff.) in which Aristotle uses the word *phantasma* to refer to a thought or envisaging occurring to the agent in sleep over and above the representative dream-image. This might be a further image, but the suggestion is that this *phantasma*, unlike the dream-impress, which resembles something in the world and is due to the interaction of external forces with the animal's physiology, results from the animal's active thinking and interpreting. If a picture, it is one he is engaged in painting, rather than one presented to him for contemplation.

And there is evidence that Aristotle found even this degree of reliance on imaging unsatisfactory. In the *MA*, almost certainly later than the *Mem.*, he refers briefly to a theory of memory that does not seem to introduce images at all. The objects of memory are the pleasant and painful things in the world, and memory is an awareness of these things as shadows (*eidōla*),⁴⁶ i.e., as no longer extant. If this is a conscious revision of his earlier theory, it is an interesting one, along the very lines suggested by some modern criticism of image-theories: imagining, memory, etc., are to be described not as the awareness of pictures of things, but as a special sort of awareness of the things themselves: an awareness shaped by the passage of time and by various current aims and projects of the agent.

It is, however, more disturbing to find a decaying-sense account of *phantasia* in the *DA* itself. For III.3 is usually taken to be the canonical account of *phantasia*, the one place in which Aristotle expounds his theory of what *phantasia* is, and with reference to which alone we must interpret any passage in which the word occurs. After his attempt to distinguish *phantasia* from other cognitive faculties, Aristotle appends a discussion that explains delusion by false appearances, using a theory of motions (*kinēseis*) set up by actual perception, that remain even in the absence of the object and are “similar” to the actual perceptions (428^b14, 429^a5). The talk of similarity seems to indicate that Aristotle is thinking of resembling images of the sort described in the passages cited from the *PN*. If we grant that the final paragraph of III.3 represents Aristotle's canonical discussion of *phantasia*, we will be forced to find images in many passages where the context alone would not indicate their presence. But it is difficult to interpret III.3 as a coherent whole building up to the decaying-sense discussion as to a definitive summary. Much has been said earlier in the discussion that does not fit with such a narrow theory. The contrast between *phantasia* and *doxa* invoked *phantasia* to explain error in the presence of the object. The sun-example, as we saw, makes

⁴⁶ *MA* 702^a5; cf. note on this line; and also my review of Louis.

poor sense if we suppose Aristotle to be explaining the fact that the sun looks a foot long by referring to a foot-long picture or bodily impress. Again, *phantasia*, in contrast to belief, was said to be "in our power" (427^b17 ff.). Here the range of the *phantasia*-cases in question is somewhat restricted (not *all* appearing, clearly, is "in our power"), but not as it is restricted in the decaying-sense passages: the *phantasia* in question here is active conjuring, envisaging, not the relic of perceptual change. At 428^a14 ff., *phantasia* is used to explain the unclear perception of an actual object, as well as the after-images that appear to people with their eyes closed. Aristotle in III.3, as elsewhere, directs his attention to a wide variety of phenomena under the rubric of *phantasia*, phenomena that he does not always clearly distinguish. The decaying-sense analysis at the chapter's end does not fit the entire discussion. The best course for the interpreter seems to be not to try to read inconsistencies away, or to try to make everything fit with what seems the most technical passage, but to allow Aristotelian *phantasia* the broad scope here that it evidently has elsewhere and recognize the diversity of the phenomena in question. Out of a very general concern with appearing and awareness, Aristotle develops theories to account for a number of different occurrences; in all but a few the connection with the original interest remains strong.

But a further problem remains in III.3. Introducing the whole account, and difficult to see as a slip or an aberration, is the remark (428^a1-4):

If *phantasia* is that in virtue of which some *phantasma* comes-to-be for us, and not what we call *phantasia* using a transferred sense (*kata metaphoran*), it is one of those capacities or dispositions in virtue of which we make distinctions, and tell truth or falsehood.

Aristotle is somehow restricting the use of *phantasia*, ruling out the "transferred" use. Most commentators have taken this to be a bracketing of the general uses connected with *phainetai*, and a limiting to the cases where the creature has a mental image. This seems suspect for several reasons:

(1) There is no good reason to suppose *phantasma* must mean "pictorial image" in this or any passage.

(2) In the ensuing discussion and in other "technical" contexts, Aristotle uses what on this view (which separates image-passages from passages that emphasize the connection with *phainetai* without reference to images) would be the ruled-out sense. He plays on the connection with *phainetai* at, e.g., 428^a7, 14, ^b2-3 and passages already cited from the *Insomn.*

(3) It is odd, and at variance with Aristotle's usual procedure, to speak of a word's basic and central ordinary use as being *kata metaphoran*. He uses this expression precisely and consistently throughout his work to designate a transfer or extension of a term to an area where it does not strictly apply—a conscious shift away from the basic ordinary usage. (It often indicates a shift of realm away from the one in which the predicate strictly applies, but may also indicate an extension to members of the same realm that cannot be truly denoted by the predicate used literally.) Examples are: the use of *oxu* ("sharp") and *baru* ("heavy") of musical pitch (*DA* 420^a29), the use of *dunamis* ("power") as a technical term in mathematics (*Metaph.* 1019^b33), the use of *andreios* ("courageous") to refer to a man who is not truly courageous, but only has some characteristics in common with the courageous man (*EN* 1115^a15).⁴⁷ The first two involve a shift of realm, the third a deliberate extension in virtue of a resemblance. The same form of words used in the present passage occurs also in the *HA*, where Aristotle asserts that all horned animals are four-footed, "except any which are said *kata metaphoran*, and by a figure of speech, to have horns" (500^a3). This is further explained at *PA* 662^b25: "And there are others that are said to have horns in virtue of some similarity and *kata metaphoran*; but none of these can perform the function of a horn." In no other Aristotelian passage is the basic use of a word in ordinary language designated as *kata metaphoran* in contrast to a newly introduced technical sense. There is, in fact, a usage of *phantasia* that would much more

⁴⁷ Cf. also *Metaph.* 1015^a11, 1019^b33, 1021^b28, 1024^a6; *EE* 1221^a30, 1233^a31.

plausibly be described as a transferred sense, and that has no connection with the occurrence of *phantasmata*. As Freudenthal correctly observed,⁴⁸ *phantasia* by Aristotle's time had acquired the transferred meaning, "(mere) show, pomp, ostentatiousness." This use makes its first appearance (the word being *phantazesthai*) in Herodotus (VII.10.5), is frequent by the time of Polybius, and appears at least once in Aristotle, in the popular style of the *Rhetoric* (1404^a11): "But all these (sc. points of diction) are *phantasia*, and aimed at the audience." This passage, unnoticed by Freudenthal, strengthens his case. The use of *phantasia* to mean "mere show" can, unlike the uses connected with *phainetai* that form the basis of the word's semantic development, accurately be described as *kata metaphoran*; and, unlike the basic use, it involves no reference to *phantasmata*, in however general a sense. Aristotle is precise about linguistic relationships. If he had meant, "and not as the many use it," or "and not in its non-scientific sense," he might easily have said so. Instead he seems to be saying, "Assuming when we say *phantasia* we mean the faculty in virtue of which we are appeared to in such-and-such a way, and are not using the transferred sense according to which it means (mere) show, then it can be said that in virtue of *phantasia* we tell truth or falsehood—whereas to say, 'in virtue of ostentatiousness we tell truth or falsehood' would be silly." It will be objected that this is a trivial point. But for Aristotle it is never trivial to recognize all the senses of a word and to indicate carefully those with which he will be concerned. And there is, after all, no reason in the context for us to see this as a major theoretical statement. It has been inflated into one because of the interpretation standardly given it. It can just as well be seen as a parenthetical aside, similar to that in the *HA* passage cited above. It need not lead us to form any other view concerning Aristotle's interests and projects than that suggested by the evidence in general. The passage has probably been interpreted as it has only because commentators, holding to the image view, had

⁴⁸ Freudenthal, 30.

already decided that the uses connected directly with *phainetai* represented one sense, the "image" uses another.

In numerous contexts, then, in which he is analyzing problems of delusion, dreaming, and memory, Aristotle speaks of *phantasia* and *phantasmata*. But the evidence indicates that his basic interest is in how things in the world appear to living creatures, what the creatures see their objects *as*. Sometimes he does speak of decaying-sense images that are like that which they represent. Occasionally these are characterized as *phantasmata*. But the evidence offers us no license for reading images into every passage, nor does the image view seem to be of such central importance to Aristotle that it robs his general observations of their broad interest. We do not need to assume that the role of *phantasia* in action and thinking must be explained by reading in images. We will find, in fact, that a more plausible and interesting account can be produced without them.

PHANTASIA AND AISTHĒSIS

The limitations of Aristotle's decaying-sense doctrine as a key to explaining all *phantasia* contexts become particularly apparent when we turn to the difficult problems concerning the connection of *phantasia* with *aisthēsis*. We saw that the statement that *phantasia* and *aisthēsis* were one, but different in *einai*, was best understood as a claim that these were two aspects to be discerned in many perceptual activities, and not that there were some activities of the perceptual capacity that should be called *phantasia*, other quite separate activities that should be called *aisthēsis*. It would not be sufficient, then, to see *phantasia* as everywhere picking out a process of decaying sense in the absence of actual perception. The theory of action in both the *MA* and the *DA* strongly claims that even when *aisthēsis* is going on, *phantasia* must also be mentioned in the explanation. The use of *phantasia* in action-contexts, and its broad connection with *phainetai* throughout Aristotle, suggested to us that *phantasia* is the faculty in virtue of which the animal sees his object as an object of a certain sort, so that we can say the perception

has for him some potentially motivating content.⁴⁹ In order to be convincing, this hypothesis must be developed in more detail against the background of Aristotle's theory of *aisthēsis*. We must discover why, according to this theory, *aisthēsis* is, by itself, insufficient to present the object in such a way that the animal is moved to act—why, instead, it must, in the *MA* terminology, “prepare” a *phantasia* which, in turn, “prepares” the desire.

The first place to which we would obviously turn for some help with these problems is the section of III.3 that contrasts *phantasia* with *aisthēsis*. We must, however, be cautious in our use of these passages to explain those dealing with action: for Aristotle seems here to be thinking primarily of *phantasia* in the absence of the perceptible object. The statement that *aisthēsis* but not *phantasia*, is always going on (428^a8–9) might mean that we are always receiving various stimuli, but not always attending to them or perceiving them as anything in particular; but it might also be taken to indicate that we have *phantasia* only when the object is not present. (Note, however, that if this second reading is correct we will have the problem of explaining why Aristotle should say *aisthēsis* goes on even in the object's absence.) The statement that *aisthēsis* is always accurate, but *phantasia* can be false (428^a11–12) is more clearly helpful in that it emphasizes the mechanical, reproductive side of *aisthēsis* in Aristotle's theory; this will prove the key to understanding the large role he gives *phantasia*. The statement that, in contrast to *doxa*, *phantasia* is in our power (427^b19–20) might be interpreted to be about conjuring and imagining alone; but it might have a broader scope and resemble Wittgenstein's “Seeing an aspect and imagining are subject to the will.”⁵⁰

A more clearly revealing distinction is the contrast drawn in the *MA* between the physicalist explanations we should provide for *phantasia* and for *aisthēsis*. *Aisthēsis* just is a bodily alteration under a different description;⁵¹ Aristotle feels con-

⁴⁹ Cf. Dennett, chapters IV, VI.

⁵⁰ Wittgenstein, *PI*, II.xi, p. 213.

⁵¹ Cf. 424^a17, 425^b27, 426^a16, 427^a3, 431^a14, 19, 432^b1.

fident that he can pick out the physiological *alloiōseis* that are its matter. He goes on to infer from the fact that *phantasia* alone, in the absence of the object, can result in motion that *phantasia*, too, is accompanied of necessity by some bodily change (701^b17–21, cf. p. 238). But the nature of the alteration is much less evident. *Phantasia*, or thought accompanied by *phantasia*, works by presenting the animal with the form or essence of its object, which has an effect like that of the object itself (701^b19 ff., 703^b19 ff.). The forms presented by *phantasia* were called the forms “of the pleasant or painful” (701^b21), or, equivalently, “of that which produces the affections” (703^b19–20). These remarks seem to imply that whereas in *aisthēsis* the animal becomes just like the object, when *phantasia* is operative he becomes aware of the object as a thing of a certain sort.⁵²

So far the evidence indicates that *phantasia* is a special kind of awareness of a perceptible object. But why is this special kind of awareness important? Our initial examination of some attempts to distinguish it from *aisthēsis* proper indicates that it is because of the passive character of Aristotelian *aisthēsis* that a further faculty is required to explain the agent's selective

⁵² The puzzling statement that *phantasmata* are like *aisthēmata*, only “without matter” (*DA* 432^a9–10) might also be taken to emphasize the active role of the phantasizing agent by stressing that, whereas in *aisthēsis* there are obvious material changes—a kind of “impress” of the object—in *phantasia* this is not the case. The context suggests that this passage could just as well be taken to mean, “a *phantasma* is like an *aisthēma*, but one that can come about when the object is not physically present.” But our interpretation derives some support from the similar language of 429^b20 ff., where reason is said to judge “as things are separate from matter” (*hōs chōrista ta pragmata tēs hulēs*)—meaning it judges forms, not particulars. While *aisthēsis* receives the impress of a particular object, *phantasia* involves seeing its form, i.e., seeing it as an F, as a thing belonging to a certain class of objects and not just as a particular materially distinct item. We could not, of course, really want to confine the operations of *phantasia* to the level of species or genus. This man can appear to me as Socrates, not just as a man. But to decide whether Aristotle's metaphysics and his theory of action really pull him in two different directions on this point would require a full analysis of *Metaph.* VII–VIII.

fastening on certain aspects of his environment. There is evidence that Aristotle did not always give *aisthēsis* such a passive role; some passages in *DA* II.5, particularly, seem to ascribe to it a more active, interpretive function.⁵³ But the passive conception still remains central in the *DA* and the *PN*. I think it can be argued that it is because of the prevalence of the passive picture (necessary, in his view, to explain perceptual accuracy), and because of his belief that the proper objects of the senses are not things but their qualities, that Aristotle is forced to turn to *phantasia* in a number of passages to explain the agent's selective interpreting of his environment. A key passage in developing this view is chapter II.12 of the *DA*.

Chapter 12 describes *aisthēsis* as "what receives perceptible forms without the matter" (424^a18–19). It is compared to wax that receives the impress of a metal signet-ring without receiving the metal itself. (Below, the case of plants will be contrasted: they are only affected when they absorb as well the matter of what affects them—424^a33 ff.). The impress is the *aisthēma*, its matter (analogous to the wax) a physiological alteration. There is, when *aisthēsis* occurs, a physiological change that is the direct impress of something in the world. The faculty seems here to play an entirely passive role, receiving, but not selecting. Aristotle has said that what *aisthēsis* receives are forms (*eidē*). Now, lest we be misled by this claim, he goes on to explain that "*aisthēsis* is affected by the things that have color or taste or sound, but not insofar as they are what each of them is spoken of as being, but insofar as they possess a certain quality, and in virtue of their relations to the sense in question."⁵⁴ Though translators differ in their renderings of crucial phrases here,⁵⁵ they seem to agree about the nature of

⁵³ I have been much helped in reading this chapter by a very interesting unpublished paper by John Cooper, delivered at the Princeton University Ancient Philosophy Conference, 1973.

⁵⁴ 424^a21 ff.: ὁμοίως δὲ καὶ ἡ αἰσθησις ἐκάστου ὑπὸ τοῦ ἔχοντος χρώμας ἢ χυμὸν ἢ ψόφον πάσχει, ἀλλ' οὐχ ἢ ἐκαστον ἐκείνων λέγεται, ἀλλ' ἢ τινονδί, καὶ κατὰ τὸν λόγον. Cf. also *DA* 430^b26–30.

⁵⁵ I follow Ross in understanding *kai kata ton logon* to refer to the previously discussed relations between each of the senses and its proper object.

the contrast. As Hicks puts it, when we perceive a rose by sight, it is not the rose *qua* rose, but the rose *qua* white that acts upon our sight. But to be moved to action an animal has to become aware of something *qua* what-it-is-called; he has to see the man as a man, not just as pale.⁵⁶ The forms said to be presented by *phantasia* were forms of the pleasant and the fearful, hence necessarily of the thing as a unitary object under some description, not just as an assortment of various perceptible characteristics. We are always passively receiving perceptual stimuli; but when we actively focus on some object in our environment, separating it out from its context and seeing it as a certain thing, the faculty of *phantasia*, or the *phantasia*-aspect of *aisthēsis*, is called into play. Aristotle is, admittedly, not entirely consistent. In some passages *aisthēsis* plays a more active part; and *phantasia* is not always mentioned where we might expect. But it seems reasonable to suppose that it was in answer to the problems growing out of his precise delimitation of *aisthēsis* in, e.g., *DA* II.12 that Aristotle turned increasingly, in the *DA*'s subsequent account of perception's role in action, to the faculty of *phantasia*.⁵⁷

There is one more curious passage that, though obscure, seems to confirm our conclusions about the interpretive function of *phantasia*. In *DA* II.8, 420^b31 ff., Aristotle distinguishes voice from mere noise:

But that which does the striking must be a living creature, and must be with some *phantasia*; for voice is a noise that is indicative (*sēmantikos*) of something.

A speaker only means or conveys something (*phonē* is, of

⁵⁶ It is, of course, called "white," as well as "rose"; but the substance-term is, for Aristotle, the one under which we must pick it out before we can go on to say anything else about it. "The white thing" does not pick out anything that we can confidently trace through time and reidentify; "rose" does. Cf. *Cat.* 5, *Metaph.* VII.1, 4, 5, etc.; Strawson, *Individuals*, chapter V. (1). [7]. 2 (168 ff.) on "sortal" and "characterizing" universals; and Wiggins, *ISTC*, especially 27–40.

⁵⁷ One answer to problems of inconsistency is to suppose that *aisthēsis*, like *phronēsis* (cf. n. 28 *supra*), is used in both a generic and a specific sense, and *phantasia*, like *politikē*, picks out a particular aspect of its activity.

course, more general than *logos*) if he is exercising *phantasia*. Hicks, predictably, interprets, "It is by the presence of the image that vocal sound is mainly differentiated from mere noise."⁵⁸ This reading is singularly uninformative. If Hicks means strictly a decaying-sense image, this is surely too confining. We very often use voice in the presence of the perceptible object. If he means some image that is produced alongside the *aisthēma*, but is distinct from it, neither he nor Aristotle shows us how to make the distinction.⁵⁹ It seems more plausible to see Aristotle as saying simply that an animal's utterance conveys something only if it is *about* something—i.e., only if the animal is aware of something in the world in virtue of the faculty of *phantasia*. On this view voice is *semantikos* of an object or state of affairs to which the animal has directed his attention. On the image reading, it is *semantikos* not of an object, but of the mental picture; this seems to be a bizarre claim, for which it would be difficult to find either textual or philosophical backing.⁶⁰

The theory of *phantasia*, then, helps Aristotle to account for the interpretive side of perception; and it does more. The claim

⁵⁸ Hicks, in his note on this passage.

⁵⁹ Hicks's conclusion that we require an image even in the presence of the object suggests the following suspicious line of thought: psychic processes must always have an object. If the actual object is absent (as in many cases of *phantasia*) we must supply an internal object. But since Aristotle must have had a unitary theory of *phantasia*, we will have to say an image is present even in cases where the object itself is actually there.

⁶⁰ It is true that in *DI* chapter 1 Aristotle makes two claims: (1) Vocal sounds are *symbola* of psychic affection. (2) These affections (*pathēmata*) are the same for all men and are likenesses (*homoioēmata*) of actual states of affairs. Only the second claim is troublesome, since we would agree that *phantasia* is a psychic process and that when vocal sounds are emitted that is a sign that some psychic process is taking place. But this early work does not make the important distinction between the role of *aisthēsis* and that of *phantasia* to which Aristotle is forced in the *DA* by considerations such as we have outlined. So the talk of similarity may refer only to the passivity of *aisthēsis* and the status of the *aisthēma* as "impress." And the *DA* passage may well be a later correction in view of the theory of *phantasia*: mere *aisthēsis*, and the representative *aisthēma*, are not enough.

that *aisthēsis* and *phantasia* are "the same faculty" now amounts to the contention that reception and interpretation are not separable, but thoroughly interdependent. There is no receptive "innocent eye" in perception. How something *phainetai* to me is obviously bound up with my past, my prejudices, and my needs. But if it is only in virtue of *phantasia*, and not *aisthēsis* alone, that I apprehend the object as an object, then it follows that there is no uninterpreted or "innocent" view of it, no distinction—at least on the level of form or object-perception—between the given, or received, and the interpreted.⁶¹ *Aisthēsis* still seems to present uninterpreted colors, sounds, etc.; to this extent Aristotle is still a believer in the given. But this theory of *phantasia* (like his theory of the *phainomena* in his philosophy of science) has taken him a long way in a more promising direction.

PHANTASIA AND OREXIS

Phantasia, then, is the animal's awareness of some object or state of affairs, which may well prove to be an object of desire. It can serve both to present the object of desire initially and, later, to specify the object at hand as what is desired. This need not involve two steps, but often does. I am thirsty; I have (in the absence of the object) a *phantasia* of drink. I then see a water fountain and direct my attention to it *as* drink. It is singled out from the conglomerate of my perceptions. It means something to me. I go and take a drink. *Phantasia* can also be used to account for delusion in practical cases: "Poor dog, he saw that as water (or as drink) when it was really ammonia solution." The role of *phantasia* here is, of course, the same as in the non-practical case (e.g., "He saw the sun as a foot wide"); the difference between the practical and the non-practical lies solely in the role played by desire. And in both cases the exercise of an opposing judgment can prevent the agent from acting on the basis of *phantasia*. In the case of non-linguistic creatures we will, as a rule, speak of *phantasia* only in practical cases; we

⁶¹ Cf. Goodman, *LA*, 6–10, and *The Structure of Appearance*, 132 ff.

infer the content a perception has for them from the appropriateness or inappropriateness of their response. It looked like drink to him, so he wanted it; but if he had seen it as what it was (poison), he would have stayed where he was, or run away. If we can guess at the creature's probable desires, we can infer from the behavior to the *phantasia*.⁶² But I think it would be a mistake to conclude that *phantasia* is best analyzed as a disposition, or a tendency to treat the object as an X. It is a psychological process, for which a physiological description is always theoretically available; if we knew the physiological description, we could potentially determine the *phantasia* even in cases where no desire, and, hence, no behavior followed. (Though I suspect that the identities would be token- and not type-, so we would in practice have a hard time doing this.) Thus *phantasiai* are not logically dependent on the resulting action and can be used to explain it.⁶³

If *phantasia* is not opposed by judgment, and if the creature desires the object as presented by *phantasia*, he will, then, act accordingly. In the case of animals, there will seldom be opposition; they cannot weigh one *phantasia* against another, deliberate about which to pursue, or even correct one with the aid of judgment, so they generally just follow whatever presents itself to them as suitable.⁶⁴ With human beings, as Aristotle explains in *DA* III.11, the situation can be more complex.

⁶² There is evidence that Aristotle believed *phantasia* alone, in a limited range of cases, is sufficient to cause a part of the creature to move without desire being operative in any genuine sense—cf. chapter 11, and notes.

⁶³ On the implications of this for our understanding of the practical syllogism, cf. Essay 4.

⁶⁴ Cf. *EN* 1150^b28, 1147^b4–5, and *Metaph.* 980^b25–27, which denies that animals can acquire experience. *DA* 428^a21–23 distinguishes *phantasia* from *doxa* by claiming that the latter requires the additional element of *pistis*, which other animals lack. (*Pistis* is conviction dependent on experience, relying on *logos* as well as perception—cf. *Pol.* 1322^a32, 1326^a26, *Ph.* 262^a18, *EE* 1216^b26, etc.) Aristotle's remarks on animal psychology look rather cavalier and unreflective; his theory of motivation would obviously be more convincing if he had devoted more attention to problems of animal instinct, learning, habituation, and behavioral responses. The collection of lore about animal behavior in *HA* IX is a poor substitute for such an inquiry.

There are two types of *phantasia*, the deliberative (or calculative) and the perceptual (433^b28). Not every *phantasia* of a rational creature is a rational *phantasia*, we must assume. (The perceptual is said to “belong to other animals as well” (sc. as to humans)—433^b29–30, cf. also 434^a6.) But any that involve looking to the future, weighing one possible course of action against another, appear to be of this sort. The workings of deliberative *phantasia* are explained in the following way:

For whether he will do this or this is already the job of reasoning. And he must measure using a single criterion; for he seeks the greater good. So he is able to make one *phantasma* out of many (434^a7–10).

This is a very difficult passage for image-theorists to interpret. Ross ends up with a collage view of deliberation: the deliberating man combines elements from the different pictures in his head, ending up with a single picture.⁶⁵ This, of course, already implies that the agent does something more active than merely contemplating an image, and so is a bit nearer our view. But it seems an unfortunately crude and over-narrow picture of deliberation to ascribe to Aristotle, in that it implies (though whether or not Ross would accept the implication is unclear) that whatever criterion one selects (goodness, for example, as well as bigness or beauty) must be susceptible of pictorial representation.

I would argue that the sense of the passage is, instead, the following: creatures with reason do not always, like animals, follow one *phantasia* after another, sporadically and without an overall plan. Animals can act only according to the awareness of the moment. Human beings can, however, look to the future and to past experience, deliberating and weighing one “this” against another. They become aware of several possible courses, and are able:

(1) To see the consequences of an action as following from that action—the two “appearings” being thought by reason as a unity.

⁶⁵ Cf. Ross's commentary *ad loc.*

(2) To measure one set of consequences against another in terms of some criterion whose maximization is desired—thus relating the two sets of consequences and making a unified appearing. The discrete considerations, “This or that,” become the unity, “This rather than that.”

The relation of the deliberative *phantasia* to the practical syllogism would then be twofold: first, the sort of deliberation envisaged here could help to explain chains of reasoning, as in the “cloak” example in *MA* 7: “I want X, but to have X I must get Y first,” and so on. Second, having reasoned in chain fashion about different possible courses, a man can compare the outcomes with a view to the good desired. Thus the man in *MA* 7 who needs covering might consider several candidates for the minor premise, speculating on which would give him the degree of warmth he required. Other animals, too, employ the structures revealed in the *MA* account of the syllogism, but only men have the *phantasian ek sullogismou* (“from inference”),⁶⁶ and, in consequence, animals’ desires have no results of deliberation to work with; the animal is ruled now by one desire (as the result of a particular activity of *phantasia*), now by another.

So far the account of deliberative *phantasia* has been interpreted without reference to images, even to episodes of visualizing. But it seems fair to concede at this point that Aristotle does, in *DA* III.7 (431^b6–8), speak of calculation about the future as though it involved a kind of picturing: “When one calculates, using the *phantasmata* or *noēmata* in the soul, as if one saw the things, and plans for the future in view of the present. . . .” The fact that *noēmata* are included here alongside *phantasmata* indicates that Aristotle is not committing himself to explaining all *phantasia* cases with reference to picture-like internal objects; but he may be saying here, and in III.11 as well, that the activity of deliberative *phantasia* often can involve picturing, or at least some sort of envisaging. This is not an implausible thing to say. I have interpreted the passages speaking only of

⁶⁶ With Hicks, I take this to be the natural construction of *tēn* at 434^a11.

“appearing” in order to show that coherent sense can be made of them without invoking pictorial images, a sense that seems to tie them more closely to what I have argued is Aristotle’s basic intuition in constructing a theory of awareness.

PHANTASIA AND THINKING

Aristotle insists in both *DA* III.9 and *MA* 6–7 that thinking by itself is insufficient to lead to action. The object of thought must be present to the animal’s awareness as an object of desire before he will move towards it. It is, as we argued, through *phantasia* that a perceptible object is seen as an object under a certain formal description. Only once *phantasia* has endowed the object of perception with a formal content can it become an object of pursuit or avoidance. This is what Aristotle seems to mean by saying that in the *phantasmata* what is to be pursued or avoided is determined (*hōristai*) for the creature (431^b2). In *DA* III.7 he takes the further step of invoking *phantasia* to explain how we can be moved to action by thinking of a non-present object: the noetic faculty is said to be provided with the form of its object by *phantasmata*, which provide a starting-point for the operations of desire. *Phantasia* ties abstract thought to concrete perceptible objects or situations, the form of which it presents to the noetic faculty. To use as an example the *Rhet.* passage (1370^b32) cited in note 44, one might say that victory is regarded as desirable because we have an awareness of being superior: our thought of victory is tied to the concrete impression of getting the better of some enemy, and it is such focussing on the concrete that gives thought its motivating power. Desire never has a purely abstract object.

One further reason for introducing the *phantasma* into the explanation of thinking was, we suggested, to maintain a consistently physicalist picture of action. Aristotle does not wish to say that thought processes are identical with, or even necessarily accompanied by, any physiological change. But in living, sublunary creatures, every thought is accompanied by a quasi-

sensory awareness of the form of the object, and this is necessarily linked to some physiological change. This argument implies that in cases in which a judgment opposes a sensory *phantasia*, this judgment cannot lead to action unless it is accompanied by a further activity of *phantasia*, hence a physiological change.

We arrive here at the most difficult part of Aristotle's discussion of *phantasia* and *noësis*—his claim that *phantasia* is active every time we have any thought at all. Elsewhere he often emphasizes the importance of perceptual experience for the exercise of intellectual faculties. *De Sensu* 1 (437^a2 ff.) claims that perception, which makes us aware of distinctions, is essential for practical wisdom (cf. also the opening of *Metaph.* I and *Sens.* 445^b16 ff.). In *APo* I.18 (81^a38 ff.), Aristotle argues that perception is essential both to induction and to demonstration, since induction proceeds from particulars and the first principles of demonstration are arrived at by induction. But *DA* III.8 claimed not only that the ability to perceive is a necessary condition for thinking in general (432^a6–7), but also that all our thinking, theoretical as well as practical, is necessarily accompanied by some activity of *phantasia*.

Aristotle does not explain this blanket claim with any care; but we are in a position to conjecture. There is no thinking (whether practical or theoretical) that is simply abstract; I cannot think of a pure proposition. For every thought there is some episode of symbolizing or envisaging that, as it were, provides a concrete vehicle for the thought. I do not simply think of the Principle of Non-Contradiction, in all its abstract purity. At the same time I am also somehow symbolizing it to myself, whether by imagining an example of it, or a logical formalization, or even by saying some words.⁶⁷ Another point made by Aristotle in this regard (*Mem.* 449^b31 ff.) is that usually my symbolization will convey other strictly unnecessary information: I want to think about the mathematical abstraction, Triangle, and my thought is accompanied by the envisaging of a particular kind of triangle, having a certain size.

⁶⁷ Cf. some useful remarks by Price, p. 139.

I am inclined to think that, so far, the theory is true. It is, insofar as it is true, merely an empirical claim, which might be upset by the discovery of people who do think in purely abstract fashion. But that is, presumably, all Aristotle means to claim for it. God would not require *phantasia*. There are, however, a number of problems with Aristotle's exposition of his view. He suggests strongly, with his *Mem.* triangle example (which even uses the phrase "he places before his eyes"), that the activity he has in mind is quasi-visual and involves a picture-like object, and, too, that this object symbolizes in virtue of a similarity. He may even be suggesting that every such object, like a picture, is definite (and dense?) in a way we have argued imaginings need not be: he seems to say we *can't help* picturing the triangle as of some definite size. Aristotle takes picturing as his central case and similarity as his central case of pictorial representation. He does not present the example as an exhaustive analysis, but he certainly does not indicate that such a reading of it would be limited or wrong. (The fact that as he concludes his III.8 exposition he is troubled about how to distinguish *phantasmata* from the *prōta noēmata*⁶⁸ does, however, suggest that he is not deliberately restricting the account to the pictorial—for how, then, would any such confusion arise?)

A second problem is that his denial that thinking is physical commits him to what we might consider a messy overcomplexity. If it is true that my thought of the sun's true size must be accompanied by some symbolizing, isn't it very likely to be much the same as the pre-judgmental *phantasia* that sees it as a foot wide? But the exigencies of Aristotle's account of action, as we saw, will force him in all such cases (for we have no reason to think the sun case ought to be analyzed differently from a practical case) to insert an extra *phantasia*. One solution might be for Aristotle to adopt for thinking the same sort of account he gives for other life-processes: that it is a functional state of matter (cf. Essays 1 and 3). But there are, I think, good non-arbitrary reasons (having nothing to do with Platonist con-

⁶⁸ Probably the *asuntheta*, the basic and simple concepts discussed in *Metaph.* IX.10.

servatism) that prevent the adoption of this picture—reasons connected with his theory of action and responsibility.⁶⁹ This, however, is not the time to become enmeshed in an analysis of these complicated problems.

Aristotle's theory of *phantasia* attempts to deal with a large range of problems. With some of these it is more successful than with others. And the theory is so inclusive that it is not always easy to see how its various parts fall into place, or even whether they really do constitute a unified theory. The basic insight underlying the theory is the important one that perceptual reception is inseparable from interpretation—that we cannot explain an animal's perception of something as a distinct feature in his environment with reference only to a process of receiving or imprinting, but must refer also to his interpretive activity, the activity in virtue of which the scene appears a certain way to him. This activity, as Aristotle saw, is dependent not only on the creature's natural endowment, but also on its past and on its other present activities. As in science generally the philosopher must begin with and return to the *phainomena* (and not to some "pure" or "raw" data), so, in the explanation of action, he must begin not with received, unprocessed sensory material, but with the way the world looks to the particular creature, what it sees things *as*. It is this interest in appearing, and not a conviction that images play a central explanatory role, that underlies Aristotle's development of a theory of *phantasia* and his use of it to explain such apparently diverse happenings as imagination, dreaming, delusion, and motivation. This unified theory of awareness supplements his account of *aisthēsis* in an important way. Imaging could, and does, find its place within this theory, but Aristotle is right not to make it theoretically central; because he does not, his sub-theory of imaging is less objectionable than the blanket

⁶⁹ The general line I would take would be to trace the worries of *DI* 9 about the compatibility of freedom of action with causal determinism to *DA* III.5, where the separable, non-physical *nous* is invoked to explain why, out of all the potential objects of thought, we focus on some and not others.

theory that is sometimes ascribed to him. And he is also right to make it the job of the same theory to explain both practical and non-practical cases; for these differ not cognitively, but only with reference to the role played by desire. It is perhaps the mistaken notion that epistemology and the explanation of action are, for Aristotle, two different branches of inquiry, that has led many critics to mark off some *phantasia*-contexts from others and to feel no qualms about offering an interpretation for one set that could not fit the other. To move a creature to action, an object must appear to him: he must select it, mark it off, organize it, interpret it. But this is, desire aside, what it is to *see* it. Learning to perceive, as Aristotle tells us, is learning to make distinctions.⁷⁰ The passive infant may receive some stimuli, but perception, thought, and action all presuppose the exercise of *phantasia*.⁷¹

⁷⁰ On seeing and making distinctions, cf. *Metaph.* I.1, 980^a26–27 *Sens.* 432^a2 ff., also *Ph.* 184^b2–4, where cognitive development is again a matter of progressively sophisticated sorting and interpreting. Note that Aristotle's blanket name for the cognitive faculties is the *kritika*—those that "sort" or "discriminate."

⁷¹ This paper developed side by side with a forthcoming one on the same general topic by Malcolm Schofield, which addresses itself to different passages and reaches rather different conclusions. I am indebted to him for his criticisms and for some helpful conversations about the evidence.

PART IV

COMMENTARY

CHAPTER 1

Aristotle introduces his project of giving a "common account" of animal motion, guaranteeing its basis in the inquiries into the behavior of particular species conducted in the *HA* and the *IA*. He adds that the theoretical arguments concerning the unmoved mover and the eternity of motion that he developed in *Physics* VIII will need to be tested for their conformity to our findings about the specific case of animal movement. He then begins his inquiry into the necessary conditions for motion, which will occupy him through chapter 4, by taking up a problem raised in *Physics* VIII: if an animal is to move, what must be the relation of its parts to each other? How is the division into moving and resting parts to be made? He discusses the working of joints, introducing a mathematical model that seems to be of little use to the argument. The conclusion is that an animal, whenever it moves, must have something at rest within itself, supporting itself against which the moving part moves, and that this will be so whether it moves its whole body or only a limb.

Extensive discussion of the introductory remarks in this chapter (698^a1–14) can be found in Essay 2. The relationship between the joint argument and some difficulties in the arguments of *Physics* VIII is explored in the same essay.

Title. This is also the title found in the ancient lists and in the early Greek commentators (Alex. *DA* 97,26–27; Them. *In DC* 97,16; Simpl. *In DA* 303,22; and cf. Part I, chapter 2). William's title is *De causa motus animalium*; from this, together with 698^a4 and 704^b2, Torraca reconstructs *περὶ τῆς αἰτίας τῆς κινήσεως τῶν ζώων*. This is forced; 704^b2 would, on this principle, be evidence for a similar retitling of all the *PN*, the *DA*, and the *PA*. The titles are unlikely to be Aristotle's in any case (cf. Part I, chapter 2), so there seems no reason not to accept the one offered by the tradition.

Within the *corpus*, the two references to a treatise *περὶ ζώων*

κινήσεως are to the *IA* rather than to this treatise. *DC* 284^b13–14 refers to *IA* 4 as τοῖς περὶ τῶν ζώων κινήσεις, and *PA* 696^a11–12 refers to *IA* 7 with: τὸ δ' αἴτιον ἐν τοῖς περὶ πορείας καὶ κινήσεως τῶν ζώων εἴρηται. Louis infers from this that the *MA* was not written at the time of the composition of the references. Since this dating seems likely to be correct on other grounds (cf. Part I, chapter 1), we may accept this explanation.

698^a1. περὶ δὲ κινήσεως τῆς τῶν ζώων. Openings with περὶ δέ, although common in Aristotle (*Somn.*, *Div. Somn.*, *Long.*, *Juv.*, *IA*, *GC*, *SE*), usually introduce the subject of the treatise to follow. Treatises that make a back-reference first begin with either περὶ μὲν οὖν (*Meteor.*; cf. *DC* 1.2) or ἐπεὶ δὲ περὶ . . . εἴρηται (*Sens.*, *GA*). But here περὶ κινήσεως τῆς τῶν ζώων does introduce the topic of this treatise as well as referring back to preceding work on the subject. A more precise translation would be: "As for animal movement, we have spoken elsewhere of. . . . But now we must consider. . . ."

In this opening and throughout most of the treatise, κίνησις is used to mean just κίνησις κατὰ τόπον. The enumeration of its subspecies at 698^a5–7 makes this clear, as does the back-reference to *Physics* VIII, where it was local motion that was seen to be the problem case for Aristotle's theory. Chapter 5 will give a broader discussion of all sorts of change, but will argue that our conclusions about growth and alteration follow from what we conclude about local motion, the πρώτη κίνησις. (Cf. the fuller discussion in notes to chapter 5.) Other sorts of change are mentioned in the account of action in chapters 6 ff., but local motion is always seen as primary. It is local motion of the *pneuma* that sets up the alterations in the region of the heart.

2. καὶ τίνες διαφοραί. The opening of the *IA*, to which reference is made, uses διαφοραί in a very general, non-technical sense, to mean (a) differences among different parts of the same animal, and (b) differences among animals belonging to different genera (704^a7–9). The first cannot be a strict usage, though the second might be. The *MA* distinguishes the question about διαφοραί from that about incidental characteristics, so it is possible that a stricter use is intended here.

3. ἐπέσκεπται περὶ πάντων ἐν ἑτέροις. The *HA* recorded various *phainomena* about animal motion and the flexion of limbs (II.1). These data become the basis for the *IA*'s inquiry into the reasons for the way things are in each species; at 704^b9–10, the *IA* refers explicitly to the *HA* as the source of its material. The *IA* does indeed offer an account of the motions of animals within each major group, of the differentiae (cf. note on line 2, *supra*), and also of the reasons for many of the incidental characteristics of moving animals—e.g., why birds and men bend their legs in opposite directions.

4. περὶ τῆς κοινῆς αἰτίας. Cf. κοινὸς λόγος, *Metaph.* 1079^b4; κοινότατος λόγος ψυχῆς, *DA* 412^a5 (and cf. also 412^b4, 414^b23); περὶ γενέσεως καὶ φθορᾶς τῆς κοινῆς εἴρηται, *Meteor.* 338^a24. That there is a common reason was implied already by previous discussion of reasons within the separate species, since things that are spoken of as separate in species are so only in virtue of their common membership in some larger group. (*Metaph.* 1057^b35–37: τὸ δ' ἕτερον τῷ εἶδει τινὸς τὶ ἕτερόν ἐστι, καὶ δεῖ τοῦτο ἀμφοῖν ὑπάρχειν· οἷον εἰ ζῶν ἕτερον τῷ εἶδει, ἄμφορ ζῶα. ἀνάγκη ἄρα ἐν γένει τῷ αὐτῷ εἶναι τὰ ἕτερα τῷ εἶδει.)

Aristotle is always skeptical of over-ambitious general analyses not accompanied or preceded by a satisfactory account of particular cases. In *PA* I he concedes that to avoid repetition we should consider the common attributes of a well-defined natural genus before discussing those of its member species (644^a29–b7). But he never admits that one can begin a scientific account at an even more general level—e.g., with attributes common to all animals. In the *DA*, again, he emphasizes that a generic account is vacuous unless completed by more specific inquiries:

It is silly to look for a common account, both in these cases and in others, that will be the particular account of nothing that is, and not to look according to the specific and indivisible species, but to leave aside (the search for) such an account (414^b22 ff.).

But Aristotle indicates in this opening remark that the *MA* will not be defective in this way: it is constructed in full awareness

of more specific results and guarantees its conformity with them.

Having analyzed the physiology of bones, fins, and feet, Aristotle now assumes that there is some common explanation of all these kinds of motion, some general answer to the question, "Why do animals move?" This is not an uncontroversial assumption, especially when the account is supposed to hold good for human and non-human animals alike. The hypothesis that an illuminating explanation of action can be given that does not treat man apart, but focusses on what can be said of all animals in common, is an interesting one. We can see good reason why Aristotle might want to pursue it, as a corrective to prevalent tendencies to focus exclusively on man when discussing life-capacities (cf. *DA* 402^b3–5). But a number of questions immediately suggest themselves, especially in the absence of any sustained theoretical account of the hypothesis.

First, are cognition and desire really sufficiently similar in all moving animals to be susceptible of a non-vacuous generic description? The different species of desire and cognition (including intellect) are listed in chapter 6, but no attempt is made to show how, for example, wish differs from appetite, or *phantasia* from sense-perception. Aristotle simply remarks that they can "all be reduced to" (700^b18–19) the generic faculties, cognition and desire—that, though the species are different, they "hold the same place" in an explanation. How convincing and informative is this, when we are not even told which species can or must be combined with which, and what animals can be said to possess them? There is no sustained attempt to examine the differences we generally find between men and the other animals, to analyze our talk of desire and cognition as used to explain the behavior of various different types of living creatures, or to justify the assumption that a broad generic explanation of action can be illuminating.

Second, can any account of animal physiology be useful if it tries to avoid remarks pertaining to certain species rather than to others? The physiological side of the *MA* is oddly vague and abstract. Can its loose account of joints, sinews, bones, and

internal organs have any genuine explanatory power without getting too specific to fit all moving animals? (Of course it does not always avoid at least some specificity: bones and tendons, limbs, joints—the remarks dealing with these pertain most directly to land animals, though they will have some kind of analogue in the other cases, and though, at 702^b19–20, Aristotle at least suggests that he does have both vertebrates and invertebrates in mind. But he tries throughout to remain at a high level of abstraction from species; and we find him—in the very pages in which he criticizes the errors of scientists deceived by their use of abstract mathematical models—producing abstract models himself, which fail to inform us of relevant aspects of the physiological picture (698^a24–^b1, 702^b12—cf. notes *ad locc.*).

Finally, it might be asked whether this general account, which tells us that the best explanation of any animal motion is teleological, mentioning the goal under its intentional description for the agent, and citing his desires and perceptions as the salient explanatory factors, is really applicable to non-human animals. Do we really want to treat animals as "intentional systems" and to argue that their conception of the good can or should enter into the best account of their motions? Perhaps they are more like automata, for whom a simple stimulus-response account would be sufficient. This, the most serious of these challenges to the *MA* project, is also the one to which Aristotle seems to have devoted the most thought. The *MA*, like certain passages in *EN* III, is his implicit answer.

From the time of *Physics* VIII, Aristotle has been perplexed about whether animals can genuinely be called self-movers. (For a fuller statement of the problem, and Aristotle's tentative solution, cf. Essay 2.) In some earlier works, he proposed a sharp distinction between cases where *dianoia* was involved and cases where it was not, apparently denying that intentionality is relevant to the explanation of non-rational cases (cf. note on chapter 11, 703^b2). He appeared in *Physics* VIII to consider adopting a simple stimulus-response account for animal motion, But in the *MA* and in *EN* III he claims that this is not enough:

to give an adequate explanation of animal motion, we must mention the animal's desires and his conception of the end. Although in points of detail, both physiological and psychological, the *MA* may often seem too vague to be useful, Aristotle's decision to present this general account arises not just from some arbitrary feeling that he needs a general summary for his biological work, but from the conviction, supported both here and in the *EN*, that animals, like humans, do act, and act *hekousiōs*—that is, in such a way that their *phantasia* of the end or good must enter into the best explanation of their actions. Descartes could not have written this introduction; for him, other animals are automata, and there is no "common explanation" of motion. The Aristotle of the *EE* and of *Metaph.* IX.5 seemed to be moving towards a Cartesian position. But in this treatise, although he will use a most Cartesian example (the automata of chapter 7), the thrust of the whole argument is against his earlier proto-Cartesian sympathies. The *MA* project is neither capricious nor vacuous, but consistent with and a useful development of Aristotle's later thought about human and non-human animals. (Cf. further comments on these issues in Essay 1, and at 703^b2 ff.)

5. *κινεῖσθαι κίνησιν*. For some examples of the internal accusative with *κινεῖσθαι*, cf. 699^a23-24; *Ph.* 235^a20, 237^b25, 254^b19-20, 255^a11, 259^b10-11, 264^a29, 265^a4-5,8; *DC* 273^b30-31, 274^a15-16, 276^b27-28, 288^a11. With *κινεῖν*: *Ph.* 251^a28-29, 260^a19,25; *DA* 432^a17,^b14.

5-7. *τὰ μὲν . . . τοιούτους*. The same groupings are used at 698^b17: *οὐδ' ἔσται οὔτε πορεία, εἰ μὴ ἡ γῆ μένοι, οὔτε πτήσις ἢ νεῦσις, εἰ μὴ ὁ ἀήρ ἢ ἡ θάλαττα ἀντερείδοι*. And cf. also *IA* 708^b27: *οὐτ' ἂν πορεία οὔτε νεῦσις οὔτε πτήσις ᾗν*. *πορεία* seems, then, to mean land-locomotion in general. *HA* 501^a1-3 distinguishes the *βάδις* of the adult from the "four-footed" creeping of the infant, and calls both forms of *πορεία*. Elsewhere, however, the *πορευτικά* and the *ἐρπυστικά* are said to be two different species of footed land animals (*HA* 487^b18-21), and the same passage refers to a type of marine creature as *πορευτικόν*, apparently because it progresses by means of feet

across the sea floor (487^b18 f., and cf. 487^b31, *PA* 685^a15, *et al.*). *IA* 3 offers a different distinction: between the *ἀλλόμενα*, which move with the whole body at once, and the *πορευόμενα*, who move *κατὰ μέρος*. A further complication is that *PA* 639^b1-3 lists the four species of local motion as *πτήσις*, *νεῦσις*, *βάδις*, and *ἐρψις*; a similar division is found at *EN* 1174^a29 f. And *πορεία* in numerous passages acquires a broad generic sense, designating the genus of which *νεῦσις*, *πτήσις*, etc., are species: e.g., *DA* 432^b26, 434^b25, and possibly *IA* 704^b21—though here Aristotle adds *καὶ περὶ πᾶσαν τὴν κατὰ τόπον μεταβολήν*, as if to cover whatever does not fall under *πορεία*. Aristotle's distinctions are far from consistent; but here in the *MA* *πορεία* seems to mean, roughly, locomotion with feet pressing against an earthy surface (this could include marine creatures on the ocean floor), and the *ἄλλοι τρόποι* would include *ἄλσις*, and possibly *ἐρψις*, if this is not covered by *πορεία*.

8. *τούτου δὲ τὸ ἀκίνητον*. Bekker and Louis adopt *τοῦτο*, claimed to be the reading of S. The fact that S actually reads *τούτου*, with the cognate and superior 0^a and all other manuscripts, makes their choice indefensible. And Louis's translation ("que d'une part ce qui se meut soi-même est le principe des autres mouvements, que d'autre part il n'est pas mu lui-même") suggests either that the self-moving animal is unmoved or that the unmoved soul is a self-mover, neither of which is the case.

11-12. *τῷ λόγῳ καθόλου. καθόλου*, omitted by Jaeger, is included by all other editors and translators and is almost certainly correct. For a parallel expression, cf. *GA* 729^a23-24: *ἐκ τε τῶν εἰρημένων δῆλον καὶ κατὰ τὸν λόγον καθόλου σκοπούμεναι*. On the importance of making sure that general theories are in harmony with the appearances and result from a detailed acquaintance with them, cf. above on 1.4; and also *HA* 491^a7-14, *GC* 316^a5-14, *GA* 757^b35 ff., 760^b28 ff., 788^b19 ff., *DC* 306^a5 ff. A good theory should begin from a careful survey of the relevant *phainomena*, and will be assessed according to its ability to predict and explain them.

16-17. *δεῖ γὰρ . . . εἶναι*. If the creature is to move, either

limb by limb or as a whole, the argument runs, there must be a division into moving and moved parts within it. The heavens, however, do not require any such division, and their shape is the least suitable for progression (*Ph.* 255^a12 f., 240^b8 f.; *DC* 290^a29–^b8, 291^b16; *IA* 3; and cf. Essay 2). So evidently the argument works only for creatures who are self-moving from place to place (the spheres being self-moving in the same place), within the sublunary sphere; and it must rely on some assumptions about the nature and capabilities of their bodies and the nature of the environment in which they move. Given that their activity involves moving from place to place in a medium such as water or air, or across the earth's surface, and given that their bodies must be composed of the sublunary elements—given these restrictions, it is good for animals to have joints. But nature was also correct in assigning to the spheres and the stars the shape furthest from this.

Aristotle in this chapter will be looking at the animal limb by limb and will not yet draw any conclusions about how the whole organism must be constituted. In chapters 8–9, however, he will argue that motion at joints in the limbs presupposes a single central ἀρχή of local motion, the area around the heart or its analogue. That argument, as we shall see, requires the assumption (unstated there) that each creature is an organic unity, so that the ἀρχαὶ κινήσεως in the separate joints can exist only potentially when the animal is united (see note on 702^a21). He seems to give himself that assumption here, the argument being that if the *whole* creature is to be moved, its *parts* must be related in such-and-such a way.

The *IA* has already discussed joints at some length. In chapter 3 we are told that the “parts” in the joints press against each other (705^a14–15), and in chapter 9, that both κάμψις and εὐθύνσις require something at rest. κάμψις is a change from a straight line to an arc or angle, εὐθύνσις a change from one of these to a straight line (cf. *Meteor.* 380^a2). And in both the change must take place πρὸς ἐν σημεῖον (708^b25). But if there is no κάμψις there can be no stepping or swimming or flying (708^b26 f.). The discussion provides, however, no analysis of

what actually happens in the joint itself, and does not tell what is meant by saying that bending takes place with reference to a single point. This would seem to be the purpose with which Aristotle returns to the subject here.

18. ὥσπερ . . . καμπαῖς. *IA* 3 committed Aristotle only to saying that the two elements in a joint must be in contact. Chapter 9 had added that there must be something at rest, since change takes place with reference to a single point. It is not clear how Aristotle arrived at this conclusion from the earlier observation, nor, indeed, how he feels himself entitled to it now. He seems to refer back to a similar argument in the *DA* (433^b21 ff.), where, discussing motion and rest in the ball and socket joint, he had similarly inferred the necessity for a resting “center” (διὸ δέ, ὥσπερ ἐν κύκλῳ, μένειν τι, καὶ ἐντεῦθεν ἀρχεσθαι τὴν κίνησιν) from the fact that all motion is a form of pushing and pulling; but this would seem to justify only the inference that the two elements must be μεγέθει ἀχώριστα (433^b25). In *MA* 1, he does not actually state the faulty inference, but begins by asserting its conclusion: there must be something at rest. And joints are useful for providing this something, since there is, so to speak, a resting center. To fill in the gaps in the argument, Aristotle might have added, here or in the *IA*, more extensive discussion of how tendons and muscles are attached to bones, and how, if the upper element were not “at rest,” at least relatively to the motion of the lower, these would be slackened in such a way that motion would be rendered impossible. But he elects here to bypass concrete physiological details for the simplicity of a mathematical model (cf. note on 698^a24–^b1).

19. καὶ ἐν καὶ δύο. Cf. *DA* 427^a10, and especially *PA* 654^a36 f., in the discussion of why all bones are linked with the rest: . . . ἵνα χρήται ἡ φύσις καὶ ὡς ἐνὶ καὶ συνεχεῖ καὶ ὡς δυοὶ καὶ διηρημένοις πρὸς τὴν κάμψιν.

20. μεταβάλλον δυνάμει καὶ ἐνεργείᾳ. When the limb is straight it is actually one, potentially two; when bent, the reverse.

22–24. ὥσπερ . . . ἡ ΑΓ. Having already invoked a mathe-

mathematical model for joints by speaking of the "center" and the "points" in the joints (cf. *IA* 9, *loc. cit.*), Aristotle now elaborates the model using a diagram like the one reproduced for us in Michael of Ephesos (see the translation *ad loc.*). The sense of the passage is clear. DAB is the diameter, representing an unbent limb; A is the "center" which represents the joint, DAC an angle which represents the bent limb after the rotation of the lower segment AB around A. For a discussion of J. Cook Wilson's proposed emendation,¹ and a full defence of my own, see *HSCP*, pp. 139–40. The problem with the received text (*ἡ μὲν Α καὶ ἡ Δ μέντοι, ἡ δὲ Β κινεῖται*) is that points are designated by feminine articles, a usage unparalleled in Aristotle. Segments are commonly so designated; and *ἡ δὲ Β* will be elliptical for the entire segment AB of which B is one end-point—also a fairly common practice (cf. especially *Ph.* 258^a25–30).

24–698^b1. *ἀλλ' ἐνταῦθα . . . διαιρετά.* Aristotle warns us against an overliteral interpretation of his geometrical model: a point, having no extension, is in no way divisible, and movement in mathematical objects is a fiction. In chapter 3, he will again discuss the potentially misleading aspects of a mathematical model: the pole-theorists have been led to ascribe *δύναμις* to points, which have no *μέγεθος* (699^a20–24); but no point is a substance. The criticism of the Atlas theorists later in the same chapter contains an implicit admission that he himself was led into error by an earlier use of a mathematical model: the *DC* theory of the resting earth is guilty of treating it like a point rather than a body (699^a31–32, analyzed in Essay 2).

The parenthetical remark about motion, as it is contained in the majority of the MSS, shows Aristotle as endorsing the admission made by some group of thinkers that their reference to motion among mathematical objects is a fiction; they concede his point that no mathematical entity really moves. This is possible. But if we accept P's *κινεῖται* (easily corrupted by the influence of the preceding *κινεῖσθαι*), the passage reads as a character-

istic Aristotelian criticism of Plato's astronomy. At *Metaph.* 997^a34 ff., Aristotle criticizes the Platonic theory of mathematical entities (*τὰ μεταξύ*) on the grounds that it requires the postulation of a separate mathematical heaven beyond the perceptible one—a position Aristotle calls *ἀτοπον*, but which Plato, in *Republic* 529 c 7 ff., develops as a serious part of his theory. Socrates there claims that real motion (*τὸ ὄν τάχος καὶ ἡ οὐσα βραδύτης*) is to be found not in the visible heavens but in the intelligible, mathematical realm beyond. Aristotle, on the other hand, firmly dissociates the objects of astronomy from the other mathematical objects, ascribing motion only to the former: *τὰ γὰρ μαθηματικὰ τῶν ὄντων ἀνευ κινήσεως ἐστίν, ἔξω τῶν περὶ τὴν ἀστρολογίαν* (*Metaph.* 989^b32, and cf. also 1026^a13, 1064^a30). If *κινεῖται* is read, Aristotle is again rebuking Plato for ascribing motion to mathematical objects, and *ὡς φασί* will go with *τὸ κινεῖσθαι* alone, indicating that a single item of his discourse has been picked out for attention. (For parenthetical *φασί* to indicate the borrowing of a single term or expression—once again from Plato—cf. *EN* 1109^a34: *ἐπεὶ οὖν τοῦ μέσου τυχεῖν ἄκρως χαλεπὸν, κατὰ τὸν δεύτερον, φασί, πλοῦν τὰ ἐλάχιστα ληπτέον τῶν κακῶν.* The sentiment of the sentence as a whole is unquestionably Aristotle's.) For the plural as a convention for one philosopher in particular, cf. also, for example, *Metaph.* 987^a2 f., 1078^b11 f.

Aristotle is prepared to allow the natural scientist the use of mathematical models for explanatory purposes, so long as suitable reservations are made and so long as the application of the model can be explained. For example, in *Ph.* IV.11, in setting up the correspondence between time, change, and the moving body, he writes, "The point (in the diagram) is (to be understood as) a stone, or anything of the kind" (219^b19). (Owen has suggested the convincing emendation *ἡ γὰρ στιγμή* for the *ἡ στιγμή γὰρ* of the MSS.) In V.4 he again treats the moving object as unextended. The discussion of the rainbow in *Meteor.* III makes use of an elaborate geometrical model that treats the light source as a point.² But the explanatory usefulness of this

¹ Wilson, "Difficulties," 137–38.

² Cf. Owen, "Aristotle: Method," 256–58.

procedure in the *Meteor.* is evident; in obvious ways it makes the discussion clearer and more economical, without seriously distorting the actual situation. The *MA* use of models for joints is a bit harder to understand. *DA* III.10 had given a straightforward description of a ball and socket joint; why is a geometrical model preferred here? The main point of the discussion is to show how the moving and moved in the joint, while of necessity together, play two different roles. Chapter 9 uses a similar distinction of roles between parts of the joint to infer that it must be not a point, but a μέγεθος (702^b30-31). So the very point made by the passage that invokes the model can show us the model is deficient. The actual joints of animals are not so difficult to describe that the model seems essential for clarity. If anything, it obscures the physiological situation by omitting the roles played by muscles and tendons. The only advantage one can see to this procedure from Aristotle's point of view is the chance it affords him to discuss the situation theoretically, without getting involved in concrete descriptions of the physiologies of different animals.

698^b1. ἡ ἀρχὴ ἢ πρὸς ὃ, ἢ ἀρχή. This reading (defended by Jäger and Forster) seems preferable to ἡ πρώτη. P has ἡ πρόσω, N ἡ πρώτω, so the *b* family, too, shows traces of this original reading. Torraca interprets ἡ πρώτη as "the proximate origin" (cf. *Metaph.* 1071^a36 and Ross *ad loc.*; also 1070^a1, 1070^b27, 34-35; *Ph.* 243^a3, 14, 245^a8, ^b1). ἡ πρὸς ὃ is, he claims, a gloss to indicate in what sense we are to understand ἡ πρώτη, which replaced the right reading in *a*, engendered a corruption in P, and caused the copyist of X to be so perplexed he omitted the entire phrase. I prefer to argue that ἡ πρὸς ὃ (being difficult to interpret) was corrupted in the exemplar of the *b* tradition to an incomprehensible πρόσο or πρόσω, thus giving rise to the πρόσω of P and πρώτω of N, while the source of *b*₁ made a more ambitious attempt at correction with πρώτη, and that of *b*₂ chose to abandon the phrase as hopelessly corrupt. Torraca cannot explain the origin of the PN corruptions—why should they conflate the gloss with the correct reading?—nor why X should have abandoned the right reading as well as the gloss. Further-

more, ἡ πρὸς ὃ makes excellent sense, pointing ahead to later discussions.

The sense of ἡ πρὸς ὃ is "with relation to which this movement takes place"—i.e., the ἀρχή for this movement, whatever it is in each case, remains fixed. The use of the neuter ὃ rather than the feminine form indicates that the phrase πρὸς ὃ is being used as an idiomatic title for a particular sort of ἀρχή, as, for example, in the phrase τὴν αἰτίαν τὴν οὗ ἐνεκα (*PA* 639^b12): there, "the cause (called) 'for the sake of which'", here, "the origin (called) 'against which'". For a similar idiomatic usage with περί, see *GC* 320^a11, 26. The oddness of the phrase makes it seem very unlikely to be an explanatory gloss. And it aptly introduces the arguments of chapter 8: it is not enough to speak of the ἀρχή for each single movement; we must also (as chapter 8 does) find and specify the single central ἀρχή, on which all the relative ἀρχαί are ultimately dependent. ἡ ἀρχή reminds us that, though the relative ἀρχή is an ἀρχή for this motion, it is also a τελευτή for the motion of the part above—cf. 702^b6-7.

2. τοῦ μὲν βραχίονος. For βραχίων as "forearm," cf. *HA* 502^b12: ἔχει δὲ τὸν ἀγκῶνα καὶ τὸν μηρὸν βραχεῖς ὡς πρὸς τὸν βραχίονα καὶ τὴν κνήμην, and possibly also 494^a1-2: ἀρθρὸν δὲ χειρὸς καὶ βραχίονος καρπός.

6-7. καὶ ὅλον ἄνθρωπον κινηθήσεται καὶ κατὰ μέρος. It is unclear whether the contrast is between one and the same animal moving his whole body and moving some limbs, or between an animal who moves his body "all at once" and one who does it "limb by limb". That it is the second might be suggested by *IA* 3, 705^a4 ff.: τὰ μὲν ἄνθρωπον παντὶ τῷ σώματι μεταβάλλει, καθάπερ τὰ ἀλλόμενα, τὰ δὲ μορίοις, καθάπερ τῶν πορευομένων ἕκαστον. ἐν ἀμφοτέροις δὲ ταῖς μεταβολαῖς ταύταις αἰεὶ μεταβάλλει τὸ κινούμενον ἀποστηριζόμενον πρὸς τὸ ὑποκείμενον αὐτῷ. Cf. 705^a12 and 709^b7, which explain that jumpers, too, must have joints in order to move. But both alternatives have been argued for, given that all movement of the creature as a whole involves bending at joints.

CHAPTER 2

In addition to the division between mover and moved within the animal, there must also, if the animal is to move, be something external to it that is not moved with its motion, even accidentally: a resisting surface or medium, supporting itself against which the animal will move. If the medium does not offer sufficiently stable resistance, motion will not be possible. Aristotle offers in illustration the example of a man moving a boat with a pole: if he stands inside the boat, he will not succeed, but standing on the stable river bank he will. This example seems to be phrased in such a way as to prepare the analogy between heavenly motion and animal motion which will follow.

The role of this chapter in the development of Aristotle's account of motion, and particularly of the relations between heavenly and animal motion, is discussed in Essay 2.

698^{b9}. ἀπλῶς. This means "not moved with the animal's own motion, even accidentally." The various joint-ἀρχαί, even the resting ones, are accidentally moved as the creature moves along. But there must be something external that is not so moved—though it may, of course, be moved to some degree (cf. *IA* 705^{a7} ff.). Aristotle, however, does not explicitly contrast absolute and relative stability in this chapter; on this see further in Essay 2.

10-12. ἔχει . . . φορᾶν. Aristotle announces that the conclusions of this chapter will have implications for the description of the motion of the universe. (For what these are, cf. chapter 3.) The heavens do not, being continuous and uniform, have the internal divisions and resting-points described in chapter 1. They will, however, be said—problematically—to have this sort of external unmoved "medium" that constitutes the necessary condition for their motion.

15. ὑποδώσει. *Hapax* in Aristotle, otherwise not before Aristides. The ὑπενδώσει of Y (cf. Thuc. 2.64.3) is a possibility. Nothing hangs on the choice.

15-16. οἶον . . . πορευομένοις. The passage, as it appears in the manuscripts, is corrupt: there have been numerous transpositions and attempts at repair. The sense required is clear: if the medium offers no stable resistance, one cannot move forward. We must now ask: (1) Are the *μῦοι* of line 16 mice? (2) What are they walking on? and (3) Does the second *τοῖς* refer once again to *μῦοι*, or to "people," to be supplied? (2) is the first problem we must confront. Earth, not otherwise qualified, would be a stable, not a shifting medium; and γῆ alone cannot imply *loose* earth. Farquharson's ἐν τῇ ζεῖᾳ and Platt's proposed deletion are considered and rejected in *HSCP*. The emendation ἐν πηλῷ seems plausible. Mud and sand are the two examples of unstable media for walking that would most readily come to mind; the phrase thus anticipates line 17's "if the earth does not hold firm." The corruption, which must have been an early one, may be explained by some damage in an uncial manuscript that made -λῷ illegible; ΠΗ easily became corrupted to ΘΗ by analogy to τῇ ἄμμῳ, and γῆ was supplied from line 17, or as an easy substitution.

Now we must ask who is doing the walking. In *HSCP* I accepted a suggestion of Owen's that the *μῦες* in question are not mice, but some shellfish of the same name (probably mussels) frequently mentioned by Aristotle. One sub-species of these may be called *πηλώδεις* (*HA* 547^{b27}, but an unlikely reading); and *HA* 599^{b26} ff. mentions mud and sand as favorite breeding-places for certain sorts of fish. I tried to understand the second *τοῖς* as also referring to these shellfish: they walk on both mud and sand with difficulty. This now seems wrong to me: The second *τοῖς* is much better taken with "people" understood; and the creatures who slip about in the mud are unlikely to be sea-dwellers. They may be the mice of the MSS. But I now find Diels's emendation of *μῦοι* to ἐμύοι (reported and accepted by Jaeger) the most attractive solution. These fresh-water tortoises, to which there are no extant references outside Aristotle (this would explain scribal confusion), were the subject of extensive observation in the biological works: cf. *Resp.* 470^{b17-18}, 475^{b28}; *HA* 506^{a19}, 558^{a8-11}, 589^{a28}, 29, 600^{b22}; *PA* 654^{a8},

671^a31, 35; *IA* 713^a17. They creep into their holes near the water with legs obliquely attached to their bodies (*IA* 713^a17 ff.); one can easily imagine them sliding about in the loose mud of the river-bank, whereas the sight of mice floundering in the mud would probably be less usual, less characteristic, and less striking. Diels's suggestion did not work well as long as τῇ γῇ was kept, since the only picture this gave us was of a tortoise, newly upon the land, slipping because his feet were wet. The unstable *medium* was lacking.

21. μαρτύριον δὲ τοῦτον τὸ ἀπορούμενον. This example seems to have been chosen and structured with the aim of easing the transition to a discussion by analogy of the movements of the heavenly bodies: cf. Essay 2. The boat is used at *Ph.* 254^b30ff. as an example of a moving whole that contains an internal division into movement-imparting and moved parts—presumably meaning that the human rower or pusher is separable from the boat, not that the boat is itself a self-mover, though the subsequent analogy to the self-motion of animals obscures this.

24–25. οὐδ' ἂν ὁ Τίτυος οὐδ' ὁ Βορέας. Torraca proposes to emend Τίτυος to Κίρκιος on the basis of William's *Circius*. It is inappropriate, he argues, that a giant should be named here; πνέων must be taken ἀπὸ κοινού with both names. Hence the context demands two winds. Since chapter 6 shows Γ to have some access to a MS tradition independent of both our major families (cf. Part I, chapter 3), we cannot reject his suggestion out of hand. But on examination, it proves inadequate.

Kirkios is a NNW wind, otherwise known as Thrakias, Spumonias, or Kirkias. Ps.-Ar. *De Ventis* (973^b17–21) lists these three names, but the spelling Κίρκιος is found only in Agathemerus (2.7), first century B.C. It was also proposed by Kapp as an emendation to *De Mundo* 394^b31, where the MSS read κακίαν, κεκίαν, and κέρκιον. *Meteor.* frequently cites the wind as Θρακίας. *De Ventis* informs us that Θρακίας is its most common name, Κίρκιαν being used only in Italy and Sicily. And yet Torraca bases his argument on the claim that the Stagirite would have been particularly familiar with the local winds of Thrace.

Further, to take the passage ἀπὸ κοινού one would have to establish that Kirkios as well as Boreas was a familiar mythological figure commonly personified by artists—for Aristotle relies on the familiarity of his readers with the sort of painting indicated. Boreas is, indeed, a favorite mythological figure from Homer on (cf. *Od.* V.296), particularly at Athens, since he was supposed to have been responsible for the disaster that overtook the Persian fleet (*Hdt.* 7.189). Frequently depicted on vases, he is the subject of a painting by Xeuxis described in Lucian's *Timon* (54), which is claimed by Wernicke¹ to be the one Aristotle has in mind here: a philosopher who walks along puffing himself up and shaking out his beard is said by Lucian to resemble the Xeuxis painting (cf. also Michael 106,27–28). (The manuscript E has in its margin here a sketch of such a puffing giant.) Kirkios, by contrast, is not known to have been an artistic subject, or even to have been personified in myth.

If we keep Tityos, we cannot, of course, read the passage ἀπὸ κοινού. I believe, with Moraux,² that this is not preferable in any case. A very natural reading is: “But if someone tried to do this while himself in the boat, he could not move it.” Then, as an afterthought (ἂν here marks a colon break) “—no, not even if he were Tityos, or Boreas”—naming two figures of popular mythology renowned for their strength—and then, as a further addition, to be connected only with Boreas (N.B. the singular participle and verb), “blowing from inside the boat—if he blew in the way the painters show him.” The focus of the sentence shifts twice, from the indefinite someone to the two giants, then to a narrower concentration on Boreas. (Michael's paraphrase, 106, 11 ff., makes this clear.) By using two examples, Aristotle is making two points. The Tityos example makes more graphically the same point as the example using an unnamed man. The obvious allusion is to Tityos' punish-

¹ Wernicke, “Boreas.”

² Moraux, *AntCl.* 364. Torraca's suggestion is, however, welcomed by Düring (*Gnomon*).

ment in Hades (cf. *Od.* XI.576–79): despite his enormous strength, he cannot fend off the vultures who attack him.³ The Boreas picture makes the further point that even to move the boat by blowing—a case in which the painters' version might strike many as plausible—one must blow pushing off against a stable external surface. (That confusions about the resisting surface multiply when the easy example of stepping on earth is no longer in question is evident from Philoponus' commentary on *DA* III.10 (591,30–34): he claims that only land animals require a resisting surface for their motion.)

The William corruption is to be explained as a result of the perplexity of some scribe who construed the passage Torracca's way and consequently looked for a second wind. He borrowed the name from the *De Ventis* or *De Mundo*, or perhaps he was a native of Italy or Sicily: William acted as liaison man to the Greek-speaking prelates there in connection with the Council of Lyons, and may have come by his manuscript from some such source.

26–27. ἐξ αὐτοῦ. Jaeger fails to note that EYSP and M^p read αὐτοῦ, not αὐτοῦ. To this number can now be added X, Γ, and A.M. (αὐτοῦ is printed by Torracca.) In favor of αὐτοῦ is *Meteor.* 349^b2, where it is asked if winds operate καθάπερ οἱ γραφεῖς γράφουσιν, ἐξ αὐτῶν τὴν ἀρχὴν ἀφιέντας. There is no record of any painting of Boreas in a boat; but he is usually shown blowing from within himself. Two points are made: if he were a) sitting or standing in the boat, and b) blowing the air out of himself (and not summoning winds from shore or sky), he could not move the boat.

699^a5–6. πρὸς τῶν ἐξωθέν τι ἀποστηριζόμενον μένειν. Farquharson correctly observes that a general theoretical discussion of action and reaction, which would serve to make Aristotle's position clearer, is lacking here. He refers us to *GA* 768^b18 ff.: καὶ ὅλως τὸ κινεῖν ἐξω τοῦ πρώτου ἀντικινεῖται τινα κίνησιν, οἷον τὸ ὠθεῖν ἀντωθεῖται πως καὶ ἀντιθλίβεται τὸ θλίβον. Since the *GA* almost certainly postdates the *MA*, the presence of a

fuller account there could not explain the brevity of *MA* 2. But the *GA* discussion refers explicitly back (768^b23–24) to writings on the active and passive: i.e., *GC* I. 6–9. This full discussion, together with its extended comparison between the ποιοῦν and the κινεῖν (chapter 7), is the background on which Aristotle is relying in presenting this very abbreviated account.

³ Scherling, "Tityos."

CHAPTER 3

Having established that animal movement requires something external to the animal that is ἀπλῶς unmoved, in the sense that it is no part of the whole that is moved, Aristotle attempts to establish an analogous conclusion in the case of the heavens: if they move, there must be something external, which is no part of them, that will remain ἀπλῶς unmoved in the strongest sense. This will turn out also to be the origin of the heavens' movement. Aristotle attempts to show that all other explanations of the heavens' movement make unwarranted assumptions or have undesirable consequences. First he argues against the contention that the mover is some part of, or point on, the moving sphere. He then goes on to criticize those who conceive of the heavens as moved by a superior force within the universe, pressing for support against the unmoved earth.

This chapter, and particularly the criticism of the Atlas-theorists, is discussed in Essay 2.

699^a12. εἴ τι κινεῖ τὸν ὅλον οὐρανόν. Aristotle is strictly entitled, on the basis of chapter 2, to pose the analogous problem only as follows: "If the heavens are moved, must there be something at rest?" His posing of the question here—"if something moves the heavens, must it be unmoved?"—anticipates the conclusion to be argued for, that what moves the heavens and what must be unmoved, if they are to move, must be one and the same. It looks, however, as if Aristotle is not really begging the question, since the Atlas argument and the arguments of chapter 4 both investigate the possibility that the mover and the unmoved necessary condition are not the same.

13. εἶναι τε δεῖ ἀκίνητον καὶ τοῦτο, (καὶ) μὴθὲν εἶναι τοῦ οὐρανοῦ μόριον (em. Farquharson). The text of this sentence is discussed in *HSCP*, p. 142:

The text of *a* (εἶναι τε δεῖ ἀκίνητον, καὶ τοῦτο) is retained by Bekker and Louis, but seems intolerably awkward. *bMT* read εἶναι θέλει ἀκίνητον, καὶ τοῦτο, which is retained by Jaeger and

Torraca. θέλει does not, however, seem to be sufficiently strong for this passage, which is concerned with the hypothetical necessity for heavenly motion. θέλει expresses a tendency or disposition (cf. *Meteor.* 362^a30, *MM* 1200^b16, *Metaph.* 1013^b27, and many other passages). Bonitz remarks that its sense is just about the same as that of πεφυκέναι. Forster keeps δεῖ but shifts the καὶ to after τοῦτο. This is perfectly acceptable, but I prefer the emendation of Farquharson, since the retention of the first καὶ is a useful pointer back to the discussion of animals and the conditions for their motion.

13–14. καὶ μὴθὲν εἶναι τοῦ οὐρανοῦ μόριον μὴδ' ἐν τῷ οὐρανῷ. In *DC* I.9, Aristotle tells us that the word οὐρανός is used in three senses: (1) of the substance of the outermost circumference τοῦ παντός: for we customarily give the name especially to the outermost and highest region; (2) of the region that is next to this, where we say the sun and moon are located: for we say that these, too, are ἐν τῷ οὐρανῷ; (3) of all the body enclosed by the circumference: for we use the name οὐρανός of "the whole" and "the all" (τὸ πᾶν) (278^b9 ff.). In this passage in the *MA*, two separate points must be established: (1) that the mover is not a part of the outermost sphere, and (2) that it is not anywhere within its circumference. The first is dealt with in the "pole" argument, the second in the following ones. οὐρανός is used first in sense (1), and then, apparently in a variant of sense (3) (sense (3) mentions a body, but here we require a region, as with sense (2)). It cannot be sense (1) again, since in the *DC* passage Aristotle claimed that to interpret the saying "X is ἐν τῷ οὐρανῷ" it is insufficient to understand the ἐν to mean "inside the sphere of" and keep the same sense for οὐρανός; we must, instead, understand οὐρανός to be referring, itself, to the enclosed region.

14–15. ἀνάγκη τινὸς ἀκινήτου διγγάνου κινεῖν. On these alternatives, cf. *Ph.* VIII.10, 267^a24ff.: τὸ δὲ κινεῖν εἴ ἐν, ἢ κινούμενον κινεῖ ἢ ἀκίνητον ὄν. εἰ μὲν δὲ κινούμενον, συνακολουθεῖν δεήσει καὶ μεταβάλλειν αὐτό, ἅμα δὲ κινεῖσθαι ὑπὸ τινος, ὥστε στήσεται καὶ ἔξει εἰς τὸ κινεῖσθαι ὑπὸ ἀκινήτου.

The conclusion is taken over from chapter 2: if a being in

motion moves something else, it must do so by virtue of "pressing" on something unmoved. The parallel has unfortunate consequences for Aristotle's argument. *Physics* VIII ended with a dilemma: how can the First Mover move anything, when it is without parts or extension in space? Motion can occur only where there is contact; and 226^b21–23 seemed to restrict this relation to material bodies having extension in space. To solve this dilemma, Aristotle in the *GC* (323^a12–34) appeals to a non-reciprocal sense of ἄπτεσθαι, citing the example of emotional reaction: ὥστε εἴ τι κινεῖ ἀκίνητον ὄν, ἐκείνο μὲν ἂν ἄπτοιτο τοῦ κινήτου, ἐκείνου δὲ οὐδέν· φαμέν γὰρ ἐνίοτε τὸν λυποῦντα ἄπτεσθαι ἡμῶν, ἀλλ' οὐκ αὐτοὶ ἐκείνου (323^a31 ff.). Touch need not imply bodily contact, but Aristotle adheres to the view that to be touched is to be changed; and hence the ἀκίνητον cannot be touched by the sphere. (Cf. also *GA* 768^b18 ff., quoted in note on 699^a5–6, where a similar exception to the usual rules of motion is made for the first mover.)¹ This one-way ἀφή is exploited in *Metaph.* XII to explain how the spheres are moved by the first mover.

The *MA* shows no awareness of this later and more sophisticated thought. Its suggestion that the unmoved mover can be touched indicates an imperfect awareness of the problem posed by the end of *Physics* VIII. θιγγάνειν τοῦ ἀκινήτου should be, for Aristotle, a contradiction in terms, and the *MA*'s analogy proves, in this case, a source of confusion. This is the one strong piece of evidence against a late date for the treatise, but since the argument as a whole is obviously based on *Physics* VIII, and shows an awareness also of the treatment of the active and passive in the *GC*, it seems preferable to view this crude passage either as a vestige of an early draft or as just a piece of careless and misleading writing.

15–16. καὶ τοῦτο μὴδὲν εἶναι μόριον τοῦ κινουέντος. Aristotle really needs, and later establishes, the stronger claim that the unmoved must be no part either of the moved mover or of the whole system that he moves. The unmoved earth is no part of

Atlas, but proves unsatisfactory because it is within the circumference of the heavens.

17. οὐδὲν ἔσσεσθαι τοῦ κινουμένου μόριον. Jaeger and Forster emend to ἔσται, relying on Leonicus' *erit*. But Leonicus' translation is too free to be good evidence in a case of this kind, and no emendation is necessary.

17–24. καὶ τοῦτό γ' . . . δύο ποιοῦσιν. The thinkers mentioned here argue that when the heavenly sphere is rotated no part of it can remain at rest, or it will not be a continuous whole. This sort of argument is used by Aristotle himself in the second book of the *DC*. In chapter 3, he rejects the possibility that the fixed center required for the movement of the heavens can be any part of the sphere itself: its nature as a whole is to move eternally in a circle and no part of it can be at rest, or its motion, being παρὰ φύσιν, will not be eternal (286^a13 ff., especially 15: τούτου δ' οὐδὲν οἶόν τε μένειν μόριον, οὐθ' ὅλως οὐτ' ἐπὶ τοῦ μέσου). In chapter 8 he argues that the only reasonable explanation for the movements of the stars is that they are fixed in the sphere and carried around by its motion. This is one reason why the heavens are not pulled apart (290^a6–7: τό τε μὴ διασπᾶσθαι τὸν οὐρανὸν διὰ τε τοῦτο συμβήσεται καὶ ὅτι δέδεικται συνεχὲς ὄν τὸ ὅλον). For σφαῖρα as the sphere of the fixed stars, cf. *Ph.* 265^b1; as the shape of this sphere, *DC* 290^b2.

The thinkers in question do not, however, come up with the correct solution to the problems of heavenly motion. For, having denied any part of the heavens can remain at rest, they make the moving force the two points, called "poles," around which the sphere turns. Aristotle's account does not make it clear that these points are meant to be unmoved movers, but this seems probable. To their theory that the poles have δύναμις, he raises two objections: (1) No point is a substance. (2) A simple motion cannot be imparted by two sources. To objection (1) we must supply the premise that nothing non-substantial can have δύναμις. To (2), the premise that the movement of the sphere is simple.

The first objection: Here, as in chapter 1, Aristotle warns against the danger of being misled by a mathematical model.

¹ See Owen, "Commentary."

In the criticism of the Atlas theory he will take his own earlier writing to task for making a similar error. The non-substantiality of points (as well as numbers, lines, planes, etc.) is a topic that Aristotle discusses at some length in several places. *Metaph.* III, in its fourteenth ἀπορία (III.5, 1001^b26 ff.), lists arguments for and against according them the status of substance. The pro argument runs: if not these, what are the substances of things? Not πᾶνθη, κινήσεις, or other sorts of predicates: they require a substrate, and none is a τὸδε τι. The elements appear better candidates; but (a) hot, cold, wet, and dry are merely attributes of bodies or the elements that constitute body, and (b) body is less οὐσία than the mathematical, since it requires them and not they it. Against this, Aristotle argues: (1) They cannot be in sensible bodies, so there is nothing of which they are the substance. (2) They are simply divisions of body. (3) In a solid you could claim any shape at all is present, one as much as another. (4) Substances must undergo γένεσις and φθορά to pass from being to not-being; but points, etc., do not. The ἀπορία is resolved in *Metaph.* XIII.1–3, 6–9 and XIV. 1–3, 5, 6; the claim of the mathematical to substantiality is refuted. (Cf. also *Metaph.* VIII.3, 1044^a7–9.) Aristotle corrects the claim that they can exist without body: they are prior in definition, but not in substance, since they are implied in the definition of body, but do not “excel in power of separate existence” (1077^a36–^b4).

The premise that only substance can have δύναμις or impart movement could be inferred from arguments in *GC* I.6, in the discussion of the conditions for ποιεῖν and πάσχειν. Things that act and are acted upon, Aristotle argues, must have (1) an underlying substrate in common (322^b18–19), and (2) ἀφή. ἀφή in turn requires θέσις (322^b32–33), but Aristotle here allows θέσις only to that which also has τόπος, and insists that mathematical can have θέσις only to the extent to which they can also be said to have τόπος (323^a1–2).² Thus, though points were said to have θέσις at *APo* 87^a36, 88^a33, and *Metaph.*

1016^b25, and even τὸ ἀπρεσθαι at *Metaph.* 1069^a12 and *Ph.* 227^a28, the denial to them of τόπος at *Ph.* 209^a11 and 212^b24 must be taken to deny them θέσις in the stricter *GC* sense—i.e., absolute position, relative to the real “above” and “below” in the universe. *Physics* VI.1 denies that points have τὸ συνεχές, since they do not have τὸ ἀπρεσθαι (for what has no parts has no ἔσχατα, and if whole touched whole there would not be ἀπρεσθαι in the sense required for the συνεχές). The *GC* passage goes on to establish that whatever has θέσις in the required sense will also have weight or lightness (323^a8–9), and this has been explicitly denied to points at *DC* 299^a30 ff. Things that are to act and be acted upon must, Aristotle summarizes, be separate μεγέθη with their extremes together. Aristotle then limits the δύναμις of acting as a source of change (the primary sense of δύναμις—*Metaph.* 1046^a6 f.) to substances and primarily to embodied substances. (Exception is, however, made at 323^a31 ff. to allow a bodiless, changeless substance a one-way kinetic activity—see note on 699^a14–15.) Aristotle’s criteria seem especially designed to exclude points and other mathematical and to put the scientist on his guard against an overliteral interpretation of mathematical models—cf. note on 698^a24 ff.

For the second argument (κινεῖσθαι τὴν μίαν κίνησιν ὑπὸ δυοῖν ἀδύνατον), Farquharson refers us to *Ph.* 259^a18, where Aristotle urges that it is better to hypothesize one unmoved mover rather than a plurality, if this is possible (cf. *Metaph.* 1076^a4). But this seems a different point. The *Physics* argues that, if possible, the different motions of the different spheres should be explained with reference only to a single unmoved mover; there is nothing here about the impossibility of explaining a single motion with reference to a double origin. The passage can best be understood if we read τὴν μίαν κίνησιν to mean “a simple motion”—i.e., a motion which cannot be broken down into further simpler components. (Cf. *Metaph.* 1052^a20: καὶ τούτων μᾶλλον ἐν καὶ πρότερον οὐ ἀδιαρετώτερα ἢ κινήσεις καὶ μᾶλλον ἀπλή.) Motion “according to the circle of the ecliptic” is a single motion, but has two components and a double origin

² Cf. Joachim, *Aristotle On Coming-to-be*, ad loc.

(GC II.10, DC II.12). In DC II.6, Aristotle argues that if the moving heavenly sphere is primary and simple and unchanging, what moves it must be even more clearly so: τὸ γὰρ πρῶτον τοῦ πρῶτου καὶ τὸ ἀπλοῦν τοῦ ἀπλοῦ καὶ τὸ ἀφθάρτον καὶ ἀγέννητον τοῦ ἀφθάρτου καὶ ἀγενήτου κινητικόν (288^b21 f.).

To refute the pole-theorists, then, Aristotle presupposes the truth of his own picture of the heavenly spheres and their motion. He does not tell us whether they go wrong by accepting such a picture and then arguing incoherently for a double ἀρχὴ κινήσεως, or whether their picture is internally consistent, but at odds with the truth about the heavens. His position here is in no way inconsistent with the arguments of *Metaph.* XII.8, since the other external movers there are invoked to explain the eternal motions of the planets, not as contributory causes of the motion of the *primum mobile*.

It seems impossible to identify convincingly the thinkers in question. Cherniss points confidently to Speusippus: the theory's "fundamental assumption, that the point has subsistence but no magnitude, connects it with Speusippus whose doctrine this was (cf. *Metaph.* 1085^a32–34, 1085^b27–34, 1090^b5–13)."³ Düring accepts Cherniss's conjecture.⁴ But Cherniss himself admits that the only actual fragment of Speusippus that might give direct support to this ascription (Theophr. *Metaph.* 11 A23–25 = Speusippus fr. 41) (a) cannot be translated so as to give the sense required, and (b) is probably ethical, not cosmological. The scanty physical fragments of Speusippus contain no mention of poles.⁵ Farquharson and Louis mention the Pythagoreans—presumably since they are so often charged in general with having confused points with magnitudes. Here again, there is no convincing evidence. *Metaph.* 989^a29 ff. does not acknowledge any conflict between the Pythagorean view on the motion of mathematics and Aristotle's own, though it would be most natural to do so there, and 990^a8 ff. expressly denies that they

give any account of how motion is derived from their underlying mathematical principles. Of early philosophers, Anaxagoras alone is actually recorded to have made poles an important part of his physical system (cf. DK A 1(9) and A 42(10)). Hippolytus' version (A 42) mentions that motion of the poles causes light to leap forth from the stars. Anaxagoras is further cited as having claimed that the sun, moon, and stars are all carried along with the circuit of the heavens (A 42, section 6). Aristotle did, indeed, sometimes use the plural to pick out a single philosopher—cf. note on 698^a24. But the evidence is tenuous.

A more attractive hypothesis is that the argument contains at least an element of self-criticism. In the *APo* (87^a36) Aristotle called the point an οὐσία θετός, the monad an οὐσία ἀθετός. Ross (*ad loc.*) claims that the word οὐσία is used loosely here to indicate that the mathematical are not regarded as "attributes of substances, but as subjects of further attributes." But it could be claimed with equal plausibility that in the early *APo* his concept of substance was not clear enough for him to see any objection to including points and monads, while in later writings he developed arguments denying points both οὐσία and θέσις. In *Ph.* IV.1 (208^b10–11, 21–22) he claims, if not that points have δύναμις, at least that natural places do. Here again, the insistence of the *MA* argument that only οὐσίαι can have δύναμις may be intended as criticism of an earlier position. As far as we know, Aristotle never had an astronomical theory of the kind described; but he subscribed to some of the physical premises of that theory.

24–27. ὅτι μὲν οὖν . . . διαπορήσειεν. A provisional conclusion: from this sort of consideration one can infer that something stands to all nature in the same relation as the earth does to animals and the bodies moved by them. ἐκ τῶν τοιούτων is obscure: if Aristotle means, by "from this sort of consideration," from an analogy such as the one drawn at the chapter's opening, it is blatantly question-begging. If he refers only to the pole-argument, that contains no reference to animals and establishes no such conclusion. The sentence seems to be a signpost along

³ Cherniss, *Aristotle's Criticism*, Appendix VIII, 558–59.

⁴ Düring, *Aristoteles*, 338; *RE*, 271.

⁵ Speusippus, *Fragmenta* (Lang). Cf. also the fragments more recently uncovered by Merlan, *Platonism to Neoplatonism* (1953) chapter V.

the way: this is one of a series of arguments that will seek to establish the point. (The confusion concerning *διγγάνειν*, which we noticed at the chapter's opening, remains.)

Platt's suggested emendation of τὰ ζῶα καὶ τὰ κινούμενα δι' αὐτῶν το τὰ ζῶα τὰ κινούμενα δι' αὐτῶν (*b*₁ and P omit καὶ) seems unnecessary. Aristotle elsewhere shows his interest in the movement of lifeless things by animals: cf. 700^a16–18, 700^b6, and the stick example of chapter 8.

27. οἱ δὲ μυθικῶς τὸν Ἀτλαντα ποιοῦντες. The theory and Aristotle's objections to it are discussed in detail in Essay 2. But since the passage is cryptic, some background discussion of the version of the myth used and of other Aristotelian uses of the myth seems called for. We must determine whether the passages in *Metaph.* V.23 and *DC* II.1 usually cited as comparable are really so and also whether the *MA* draws on a different and possibly later version of the story—which might be an argument against authenticity.

In *Metaph.* V.23 (1023^a20 ff.), discussing the senses of ἔχειν, Aristotle mentions as one of the available uses the prevention of something from acting or moving κατὰ τὴν αὐτοῦ ὁρμήν: οἷον οἱ κίονες τὰ ἐπικείμενα βάρη, καὶ ὡς οἱ ποιηταὶ τὸν Ἀτλαντα ποιοῦσι τὸν οὐρανὸν ἔχειν ὡς συμπεσόντ' ἂν ἐπὶ τὴν γῆν ὥσπερ καὶ τῶν φυσιολόγων τινὲς φασιν. Atlas is said to hold the heavens up much as pillars hold up a roof; the myth assumes that without such a prop the heavens will naturally fall down upon the earth. The story of Atlas is told by poets; but there are certain natural scientists who present a similar picture.

The poetic source for Aristotle's account seems to have been Hesiod's *Theogony*, 517 ff., which depicts Atlas holding up the heavens on his head and hands (Cf. also lines 746 ff., where a similar picture is given.) Both Alexander and Simplicius cite the Hesiod passage, though Simplicius, in his notes on *DC* II.1, ascribes it to Homer. Simplicius also cites the actual Homeric account, which uses a different version of the story: instead of holding the heavens up himself, Atlas is the guardian of the pillars that do this: ἔχει δὲ τε κίονας αὐτὸς/μακράς, αἱ γαῖάν τε καὶ οὐρανὸν ἀμφὶς ἔχουσιν (*Od.* I.53–54). The Hesiodic account

is, however, the version most frequently cited by ancient authors.⁶ The identity of the *physiologoi* who hold a similar view is more obscure. Alexander (*In Metaph.* 421, 10) cites the vortex theory of Empedocles, but the *DC* discussion makes it clear that there, at any rate, Empedocles is not in question, since his view is given separate treatment.

In *DC* II.1, Aristotle again criticizes the Hesiodic version of the Atlas-myth and similar views held by experts. Aristotle is arguing that the heavenly sphere is not maintained in its place above by any sort of compulsion, nor does it need to exert effort to continue in its course. If it required effort, its existence would be less happy than that of men, since it would not even enjoy the benefits of sleep. Operating on the assumption that the situation of the heavens is that which promotes the best overall order (284^a18: διαθέσεως τῆς ἀρίστης), Aristotle proceeds to refute three views that assert the heavens to be under some sort of compulsion. The first is the Atlas view, the second is the vortex view of Empedocles, and the third is the world-soul view of Plato's *Timaeus*. Aristotle offers no fully separate refutation of the Empedocles story, and he intends the criticism of the Atlas group to apply to Empedocles as well: both theories err in assuming the heavenly bodies have weight and tend downward. But there is no doubt that the two groups are to be understood as separate: the vortex theory receives independent refutation in II.13 and III.2. And Aristotle separates the groups here clearly by his transitional sentence (284^a24): οὔτε δὴ τοῦτον τὸν τρόπον ὑποληπτέον, οὔτε διὰ τὴν δίνησιν . . . καθάπερ Ἐμπεδοκλῆς φησὶν. Here is Aristotle's discussion of the myth and its theoretical counterpart:

διόπερ οὔτε κατὰ τὸν τῶν παλαιῶν μῦθον ὑποληπτέον ἔχειν, οἱ φασιν Ἀτλαντὸς τινος αὐτῷ προσδεῖσθαι τὴν σωτηρίαν· εἰκάσι γὰρ καὶ τοῦτον οἱ συστήσαντες τὸν λόγον τὴν αὐτὴν ἔχειν ὑπόληψιν τοῖς ὕστερον· ὡς γὰρ περὶ βάρος ἔχόντων καὶ γεγραμένων ἀπάντων τῶν ἄνω σωμάτων ὑπέστησαν αὐτῷ μυθικῶς ἀνάγκη ἐμψυχον (284^a19 ff.).

⁶ Wernicke, "Atlas."

The story-tellers, who tell the traditional story, are, presumably, the poets of *Metaph.* V. The second group, referred to only as οἱ ὑπερον, seem to be the same as the *physiologoi*. These, apparently, do not explicitly mention Atlas, though here Aristotle says that their postulation of an ἐμφυχος ἀνάγκη is done μυθικῶς. (This need not imply that they wrote in a poetic or story-telling style—cf. Pl. *Soph.* 242 c 8.) Their story that an Atlas-like entity supports the weight of the heavens, keeping them from falling down upon the earth, involves the assumption that the heavenly bodies are like earthy bodies, and, having weight, would tend naturally to fall downwards towards the earth, were there not some obstacle. The body of which the heavens are made, however, as Aristotle argues in *DC* I.2–4, is neither heavy nor light. Its natural motion is circular, not rectilinear, and no constraint is required to keep it moving in its natural place.

The *MA* account of the Atlas theory makes use of a different version of the myth and, unlike the passages discussed above, does not distinguish explicitly the poetic and the scientific groups, although at 699^b1 it may be distinguishing the story that mentions Atlas himself from other analogous stories (διόπερ εἴτ' "Ἀτλας εἴτε τι τοιοῦτόν ἐστιν ἕτερον τὸ κινεῖν τῶν ἐντός, οὐδὲν μᾶλλον . . .). The main difference between this story and the Hesiodic version is that here Atlas does not simply hold the heavens up, but moves them, twisting them round the poles, while his feet remain on earth. Wernicke⁷ claims that this version is late, appearing elsewhere not before Vergil (*Aen.* IV.482 = VI.797). This might be an argument against the treatise's authenticity; but it does not hold up. There are several indications, not noted by Wernicke, that the imparting of motion to the heavens was already a part of the Atlas myth, in at least some of its versions. The heavenly "pole" is mentioned as that which Atlas supports in Aes. *Prom.* 428–30:

"Ἀτλανθ' ὃς αἰὲν ὑπέροχον σθένης κραταῖον
οὐράνιον τε πόλον
νώτοις ὑποστενάζει.

⁷ *Ibid.*

Unfortunately, these lines are obviously corrupt, and have not yet been satisfactorily emended. Pindar's use of the word προσπαλαίει to describe the actions of Atlas holding the heavens (*Pyth.* 4.289) might contain a suggestion that a twisting motion is involved.

More significant is a fragment of Critias (DK 88 B 18), which names the πόλος of an obviously moving heaven after Atlas:

ἀκάμας τε χρόνος περί τ' ἀενάῳ
ρεύματι πλήρης φοιτᾷ τίκτων
αὐτὸς ἑαυτόν, δίδυμοι τ' ἄρκτοι
ταῖς ὠκυπλάνοισι περύγων ῥιπαῖς
τὸν Ἀτλάντειον τηροῦσι πόλον.

The scholiast to Aristophanes' *Birds* 179 cites a similar passage from Euripides' lost *Peirithoos*, and his comment indicates that he understands the picture to be one of a metaphorical Atlas turning the heavens: 'Ευριπίδης Περίθῳ 'καὶ τὸν Ἀτλάντιον φρουρῶν πόλον', ὡς αὐτοῦ τε περιπολουμένου καὶ δι' αὐτοῦ πάντων ἐρχομένων. Once the notion of a revolving heavenly sphere began to replace that of a simple vault or roof, the old story of Atlas was adapted to fit the situation, especially by poets fascinated by the recent progress of science and anxious to display the latest learning.

Figures such as Critias, Euripides, and other poets associated with the sophistic movement may well be the best candidates for the group of thinkers in *MA* 3 who are said to speak μυθικῶς. This would explain Aristotle's failure to name them, or designate them as belonging to a particular school. Cherniss (and Düring following him) claims that the reference is to Plato's account of the relation between the earth and the world-soul. Without even discussing his views on the difficult problems of *Timaeus* 40 b–c, which he believes to be the Platonic passage in question, we can, I think, dismiss his arguments in favor of the identification. He says the conclusion can be drawn "both from the similar procedure of *DC* 284^a18–35, where that theory and this myth are brought together, and from the fact that the question that motivates the whole discussion here is whether

the mover of the universe is part of the universe as the soul is of the living creature.”⁸ The first claim is misleading: the myth in *DC* II.1 is not used to illustrate the Platonic view; its proponents are criticized side by side with Plato, and on different grounds. The *MA* uses a different version of the myth to illustrate a different point. As for the second claim, the analogy in question here is not one to the soul as mover, but to the animal’s “resting” medium as necessary condition for motion. Soul is not even mentioned until the sixth chapter. We may agree with Cherniss that Aristotle has in mind “some more serious theory than the myth itself” while still insisting that the thinkers named probably spoke of Atlas, at least as an example. The only Platonic reference to the myth (*Phaedo* 99 c) makes quite a different point, about the importance of teleological explanation.

In short, the new version of the Atlas story in the *MA* provides no argument against the authenticity of the treatise. Aristotle has two quite different arguments in view: in the *DC* the denial of mechanical compulsion in favor of a teleological account, and in the *MA* the assertion that the movement of the heavens depends not only on there being an unmoved substance, but also on this substance’s being outside the universe.

For the arguments used by Aristotle against the Atlas-theorists, and their importance, cf. Essay 2.

28–29. ἀπὸ διανοίας . . . ὥς. This might possibly just mean, “with the idea that” (cf. *DA* 404^a17: τὴν αὐτὴν ἔχει διάνοιαν). So it is construed by Louis. But the use of ἀπὸ διανοίας at, e.g., *Ph.* 197^a2 (τὰ προαιρετὰ καὶ ἀπὸ διανοίας) and *Rhet.* 1417^a23 (μὴ ὥς ἀπὸ διανοίας λέγειν, ἀλλ’ ὥς ἀπὸ προαιρέσεως) support the stronger translation. The other is syntactically difficult in any case.

29. ὥσπερ διάμετρον ὄντα. διάμετρος here means “radius”. Farquharson notes that Greek has no separate word for this, other than ἡ ἡμίσεια διάμετρος.

31–32. ἀλλὰ . . . τοῦ παντός. On this argument, which

seems to be a criticism of the *DC*’s use of a mathematical model for motion, cf. Essay 2.

32–33. πρὸς δὲ τοῦτοις . . . τὴν τοῦ μένοντος. Torraca sees in this whole passage an anticipation of the principle of inertia and other laws of motion. Louis expresses this view with even less caution: “La force dont il est question est la force d’inertie.” Such statements need careful qualification in the light of Aristotle’s general theory of elemental motion.⁹

For Aristotle, each of the elements has a natural place; in this place alone it is naturally at rest, and to this place its natural motion tends. The tendency of pieces of earth to move towards the center is independent of the fact that the earth is there: “For if one were to take the earth and put it where the moon is now, each part of earth would not be borne there, but to where the earth is now” (*DC* 310^b3 ff.). The concepts of weight and lightness are defined with reference to these natural motions: the “absolutely light” is that which moves naturally upward, the “absolutely heavy” is that which moves naturally towards the center (308^a29–31). By “relatively light” and “lighter” is meant that of two bodies of the same volume (ὄγκος), both possessing “heaviness,” one is borne downwards less rapidly than the other (308^a31–33). There would be a different but analogous account for the light.¹⁰ This speed of motion, in turn, is proportional to density (for Aristotle, the amount of any given element packed into a set volume—*DC* 299^b8–9). In other words, Aristotle has no general notion of mass. We cannot, using his conceptual framework, compare the mass of a quantity of water to that of some air. Only two bodies sharing the same natural motion can, apparently, be heavy or light relative to each other.

In consequence, when he speaks of the ἰσχύς τοῦ μένοντος, this applies only to a body naturally at rest, i.e., in its proper place; the ἰσχύς derives from the “absolute heaviness” (or, in the other case, “absolute lightness”) of this body, and presumably

⁹ Cf. Aubenque, *REG*, 298.

¹⁰ Cf. Moraux, *DC*, *ad loc.*

⁸ Cherniss, 588–89; Düring, *Aristoteles*, 338.

the resistance offered by the earth will be proportional to both volume and density. Why, then, should Aristotle assume the earth cannot withstand the pressure exerted by Atlas as he moves the heavens? Even leaving aside the difficulties posed by Aristotle's own theory of heavenly composition (on which see Essay 2), his theory gives us no way of comparing the force it takes to move one element with that which it takes to move another. *Physics* VIII argues that the mover of the heavens must impart infinite force and so cannot be bodily, there being no infinite body. But the *MA*, attempting to support the conclusions of the *Physics*, does not in general make use of them in its arguments. The argument that follows in chapter 4 shows this conclusion is not established, since Aristotle is still concerned there with the possibility of an "overwhelming" motive force within the system. It looks as though here Aristotle is observing only that to move the entire universe the mover would need to exert a very great force (if we do not conceive of him as bodiless and external) and that we can feel sure that the earth's small size (cf. *DC* 298^a8–9, *Meteor.* 340^a6–8, 352^a27–28) makes it impossible for it to withstand such force. Lacking a way of computing the relative masses of different elements, Aristotle seems to commit the error of supposing mass is somehow proportional to volume. (The error seems to be Aristotle's, and not simply one that he ascribes to his opponents, since the argument relies on principles—e.g., the small size of the earth—drawn from his own cosmology; there is no indication Aristotle would not endorse the principle as stated.)

34. ἔστι γάρ τι πλῆθος ἰσχύος καὶ δυνάμεως. πλῆθος here means "a definite amount." Cf. *Metaph.* 1020^a8.

36–37. ὥσπερ τῶν ἐναντίων κινήσεων, οὕτω τῶν ἡρεμιῶν. This must mean, "As there is a proportion between opposing motions, so also between motions and opposing states of rest." For Aristotle, two bodies in their natural places would not act on each other, and no relation between two states of rest is in question in this passage. Just as two bodies moving with opposing motions resist each other, so does a body with certain "force of motion" resist one with a certain "force of rest."

(Cf. *Cat.* 15^b3–6, where it is said that the opposite of motion κατὰ τόπον is either rest in a place, or motion in the opposite direction.)

37–699^b1. κρατοῦνται δὲ κατὰ τὴν ὑπεροχὴν. This same phrase is used in chapter 10 (703^a25–26) to describe the way in which the elements interact with each other, the light being held down by the heavy, the heavy pushed up by the light. As we have remarked, Aristotle shows us no way of predicting how much heavy matter it will take to keep a certain portion of light down.

5. καὶ ὁμοίως κατ' ἰσχύιν. This must be read as epexegetic of the preceding: "Just as the pusher pushes, so the pushed is pushed, i.e., with similar force." Louis punctuates as two sentences: "Car l'impulsion que donne ce qui pousse correspond à celle que reçoit ce qui est poussé. Et il en va de même en ce qui concerne la force." But it is hard to see what, if not force, he takes to be in question in his first sentence.

6–7. κινεῖ . . . μὴ κινούντος δέ. The inference drawn from this obscure argument, at lines 8–10, is that the earth's "force of rest" must be equal to the "force of rest" of the whole heaven and of its mover. The argument then seems to be as follows: Atlas, who is the mover, is initially at rest (κινεῖ δὲ τὸ ἡρεμοῦν πρῶτον). So the force he exerts must be greater than his own "force of rest"—i.e., he must be able to overcome his own inertia and have some force left over to move the heavens (ὥστε μᾶλλον καὶ πλείων ἢ ἰσχύς ἢ ὁμοία καὶ ἴση τῆς ἡρεμίας). Similarly (ὡσαύτως) he must also be able to overcome the "force of rest" of the heavens: i.e., his ἰσχύς must also be greater than that which is moved by him, but is not, like him, a mover (ὡσαύτως δὲ καὶ τῆς τοῦ κινουμένου μὲν, μὴ κινούντος δέ). In consequence (οὖν) (given that whatever force he exerts against the heavens results in a corresponding downward push against the earth—cf. note on 699^a5–6), the resistance offered by the earth must be sufficient to balance the force required to move both Atlas himself and the heavens, or it will be moved from its place.

The passage is difficult, first because of the ambiguity of τὸ

ἡρεμοῦν πρῶτον—which Albertus, Farquharson, Forster, and Torraca take to be the object of κινεῖ, while Louis and Michael correctly read it as the subject. (Buridan and Burley skip rapidly over the difficulties.) Furthermore, there are problems with the text of the second sentence: the majority of MSS have the reading I have accepted, but YV (for καὶ τῆς) read καὶ ἡ, X καὶ ἡ τῆς, and E the impossible καὶ αὐ. Only Michael seems to have interpreted the whole passage correctly:

By ἡρεμοῦν πρῶτον he means Atlas. For he, resting against the earth, moves the heavens with the pillars (and the pillars, too, are moved). And since the force of the earth must of necessity withstand not only the force of Atlas, but also the force of the heavens that are moved by Atlas, it is clear that the force of the earth is greater than both of these—that of the heavens and that of Atlas (109, 9 ff.).

Torraca retains the same text, but reads τὸ ἡρεμοῦν πρῶτον as object, and, in consequence, produces a very different interpretation:

Atlante—forza motrice—imprime movimento al cielo, che ha, quando inizialmente è immobile, una certa energia di quiete. Perciò la forza che è sviluppata da Atlante, deve essere maggiore dell'energia di quiete del cielo. Questo poi, una volta messo in movimento, acquista un'energia di moto, che è inferiore a quella esercitata da Atlante: infatti, se non fosse inferiore, annullerebbe l'energia sviluppata da Atlante, e questi sarebbe travolto dal movimento del cielo. La terra, che sostiene Atlante, dovrà avere un'energia di quiete superiore alla somma dell'energia di Atlante, che muove non mosso, e dell'energia del cielo, che è mosso, ma non muove.

On such an interpretation, it is difficult to see why Aristotle needs the second part of the argument at all: if its resistance is greater than the motive force exerted against it by Atlas, it is *a fortiori* greater than the motive energy of the heavens, which are set in motion and maintained in motion by him. Further,

it is very difficult to get this out of the text. If 6–7 are read so that ἡ ἰσχύς is Atlas' force, τῆς ἡρεμίας the inertia of the heavens, it becomes almost impossible to read τῆς τοῦ κινουμένου as "the force in motion" of the same heavens. τῆς without any further filling surely refers back to ἡρεμίας; if a parallel were intended between two different sorts of force belonging to the heavens in their relation to Atlas' force, it would have to be made much more explicit; but as it stands there is a transition between talk of the ἡρεμία of the ἡρεμοῦν πρῶτον to that of the moved that does not impart motion—and there is no indication that the two are the same. Finally, Torraca has to read 9–10 in a very strained way: the earth's δύναμις ἐν τῷ ἡρεμεῖν must be at least as great as that which Atlas and the heavens have *in motion*. But it is surely most natural to understand ὅσῃν to refer to the whole phrase δύναμις ἐν τῷ ἡρεμεῖν.

Farquharson's version of this argument seems to me very obscure. He emends 7–8 to: ὡσαύτως δὲ καὶ ἡ τοῦ κινουμένου (καὶ κινούντος τῆς τοῦ κινουμένου) μὲν μὴ κινούντος δέ, and translates: "But the prime mover moves that which is to begin with at rest, so that the power it exerts is greater rather than equal and like to the power which produces absence of motion in that which is moved. And similarly also the power of what is moved and so moves must be greater than the power of that which is moved but does not initiate movement." As I understand this (no further explanation is offered), Farquharson sees first a general argument about the relation of any "first mover" in a system to what it moves, followed by a more specific analysis suitable to the case in question. Aristotle observes first that a mover must exert a force greater than the force of inertia of the moved and then notes that this is true even in the case (as here) where the first mover is a moved mover, and what he moves is moved but does not impart movement. The conclusion about the earth does not follow in any obvious way from this. Like Torraca, Farquharson understands ἐν τῷ ἡρεμεῖν only with the earth, but it is not clear how he thinks Aristotle gets from the claim that Atlas' motive force must be greater than the inertia of the heavens to the claim that the earth's inertia must be

sufficient to counterbalance Atlas' force plus the "force of the whole heavens," whatever this is taken to be. But the most serious argument against Farquharson's reading is the lengthy supplement to the text that it requires, when there is available a clear and economical interpretation of the most common manuscript version that yields the sense required by the context.

CHAPTER 4

So far, Aristotle has argued that if the heavens are moved by a moved mover (699^a14), this mover must "press against" something unmoved, and that, given the terrific force it will take to move the universe, it is impossible that the earth—the only body in the universe that might, because of its immobility, seem promising for this role—should be able to withstand "Atlas'" pressure. He has not yet shown that there is anything wrong with the idea of having a moved mover within the system, so long as the *ἀκίνητον* that provides the necessary resistance for his motion is no part of the system that is moved. There must be something unmoved outside the heavens; now he must show that this must also be the mover (or, at least, that the mover must also be outside). He argues that if there were admitted to be within the system a force capable of moving it all, this same force, since it would be "overwhelming," would be capable of destroying it. But other arguments have established that the heavens are of necessity indestructible. Aristotle goes on to point briefly to a solution: the mover, like Homer's Zeus, is wholly unmoved, single, and outside the moved system.

The chapter concludes with a brief recapitulation of the conclusions of chapters 1–2 about animals and with a discussion of the motion of the elements, which is argued to be ultimately dependent on the self-motion of animals and the heavenly bodies. Aristotle points forward to the discussion to follow in chapter 6 ff. of how living beings are moved by their object of desire.

This chapter is further discussed in Essay 2.

699^b12. τῶν τοῦ οὐρανοῦ μορίων. οὐρανός is being used here in the sense of "universe"—i.e., to include the earth and the other sublunary elements, as well as the *primum mobile*. These elements are the "parts" or components with which the argument will be concerned (cf. Michael 109, 22–24).

14–17. ἐὰν γὰρ τις . . . τὸ βᾶρος αὐτῆς. A recapitulation of

the Atlas picture. The point seems to be that even the finite force we pictured Atlas as exerting would be sufficient to displace the earth and hence to cause great confusion in the universe. The force that it would actually take to move the whole universe would be "overwhelming" (*Physics* VIII argues it must be infinite) and so all the disagreeable consequences would potentially follow even if the mover were not "pressing against" the earth in the manner of Atlas.

The impossibility of there being an infinite sensible body is argued in *Ph.* III.5, 204^a34 ff., and taken to be established in VIII.10, 267^b20–22. Aristotle uses various arguments to establish that none of the four elements can be infinite: (1) If the infinite body is complex (a) one element cannot be infinite and the others not, since the infinite one would overwhelm and destroy (*ὑπερβαλεῖ καὶ φθереῖ*) the finite (204^b15–19), but (b) it cannot be that all are infinite, since an infinite body must be infinite in extension in all directions (20–22). (2) If the infinite body is simple, (a) it cannot be something other than one of the four, since no such extra body has ever been observed (22–35), and (b) it cannot be any of the single elements, since coming-to-be requires the existence of contraries (35–205^a7). Aristotle goes on to establish the same conclusion by a consideration of the concepts of place and natural place, showing that it is not possible to hold both that bodies have natural places and that there is an infinite body (205^b24–31). For how can either the whole of the infinite or some part of it tend towards or away from the center? In the infinite we cannot even make the usual distinctions of up and down, right and left, front and back—which we say exist not just relatively to us, but absolutely in the universe (205^b31–35). Finally: there cannot be an infinite place, and every body is in place (205^b35–206^a7).

17–21 *ἐπεὶ δὲ . . . οὐκ ὁφείσεται*. Compare *DC* I. 10–12, and especially 281^b3 ff., where Aristotle argues in various ways for this conclusion: the statement, "The universe is destructible" is not merely false, the way it is false to say, "This man is singing" if he is, in fact, playing the lyre; it is impossible,

as are "This man is both sitting and standing at the same time," and "The diagonal is commensurable." The indestructibility of the universe is a matter of necessity; we cannot conceive of it as destructible without involving ourselves in hopeless paradoxes. Although the parallels cited in the *DC* are cases of logical necessity, they are contrasted not with any notion of physical necessity, but with cases of mere contingency. No distinction between logical and physical necessity is in view; and Aristotle's arguments assimilating the universe to the logical cases are not at all clear.

The *MA* discussion is more intriguing, since, on one possible reading, the contrast is between notions of logical and physical necessity. Voice is (logically, conceptually) unseeable; the men in the moon are unseeable of necessity, but only because of a physical necessity. To imagine the universe made some other way (with a nearer moon, or animals with tremendously powerful vision) is not conceptually paradoxical; but, of necessity (given the way the universe is and has been) it never will be that way. On this reading, Aristotle is holding to the principle of plenitude: to say, "They will not be seen" is equivalent to saying, "It is (physically) impossible that they should be seen." But there is another equally plausible reading: the invisibility of the men is a contingent fact about human powers; it is neither conceptually *nor* physically impossible, *simpliciter*, that they should be seen. It is impossible now, and we can confidently predict that, the way things are, they will not be seen. *οὐκ ὁφείσεται* would, on this reading, carry no implication of necessity; it would just be a prediction expected to hold good, perhaps for all time, or perhaps only for now, or for the most part.

Aristotle is, then, claiming either (1) that the indestructibility of the universe is a matter of logical, and not just physical, necessity—if we may clearly make this distinction for him—or (2) that it is a matter of necessity, and not a merely contingent impossibility. (2) is much more plausible, and parallel passages, though not conclusive, seem to support it more strongly than they do (1). At *Ph.* 204^a3 ff., the invisibility of

voice is again used as an example of one kind of impossibility ("by nature") in discussing the senses of *apeiron*. Opposed to this is that *ὁ πεφυκὸς ἔχειν μὴ ἔχει διέξοδον ἢ πέρας*. At *Metaph.* V.22 (1022^b22 ff.), the analogous example is the way a blind man lacks sight: it is his nature to see, but he cannot see. Here we could regard the impossibilities as merely contingent; the previously uncrossable or boundless may tomorrow be crossed or bounded, the sightless man may be cured. We could, however, regard it as impossible in some stronger sense for *this* object ever to realize the potential that other members of its species have. But *DA* 422^a26, which uses again the example of voice's invisibility, seems clearly interested in distinction (2): the contrast is between that which is invisible *holōs* (the way voice is) and that which is of such a nature as to be seen, but is either unseen or poorly or dimly seen. The *MA*'s men in the moon seem likely to fall into this latter group. Aristotle is not insisting that there is any sort of impossibility involved in imagining them seen, and perhaps not even claiming that nobody will ever be able to see them. He says only, "You won't see them," "They won't be seen"—a reasonable prediction, not a necessity claim. If the "won't" is meant as a serious prediction about the rest of time, plenitude is violated; if it is to be taken as loosely as I have just indicated, the question does not even arise.

19. *τοὺς ἐπὶ τῆς σελήνης*. The important point here is that Aristotle is assuming for purposes of the argument that there are such creatures, but that they are invisible to us. The existence of both animals and plants on the moon was apparently a belief of Pythagorean origin: cf. Diels, *Dox. Gr.* 36 (*Aet. Plac.* II.30: *Plut. Epit.* II.30,1 = *Stobaeus Ecl.* I.21.1; cf. also Galen, *Histor. Philos.* 71, in Diels, 628).¹ The Pythagoreans claimed, according to this report, that the moon was made of earth and inhabited by animals and plants similar to those we know, but bigger and more beautiful, with bodies that required no excretory systems. In the *GA*, Aristotle speculates that if there

are any "fire-animals," they are most likely to be found on the moon (761^b22).

21. *ἄφθαρτον εἶναι καὶ ἀδιάλυτον*. *DC* I.11 discusses the various senses of *γενητόν*, *ἀγενητόν*, *φθαρτόν*, and *ἄφθαρτον*. In its primary sense, *ἄφθαρτον* means that which exists and cannot be destroyed (280^b32: *τὸ ὄν μὲν, ἀδύνατον δὲ φθαρῆναι οὕτως ὥστε νῦν ὄν ὕστερον μὴ εἶναι ἢ ἐνδέχεσθαι μὴ εἶναι*).

22. *ἐξ ἀνάγκης*. Cf. *infra*, lines 30–31: *οὐκ ἀδύνατον δέ, εἰ μὴ τάντικείμενον ἀναγκαῖον*. On necessity and possibility here and in the *DC*, cf. note on lines 17–21 above. To refute the picture he opposes, Aristotle does not need to show that, as described, it actually has, in any particular set of circumstances, the unpleasant consequences he has mentioned, but only that the possibility is not altogether excluded. For if the possibility is admitted, over an infinite period of time it must at some point be actualized. To the opponents' implicit claim that their forces have the capability of destroying the universe, but will, in fact, never do so, since they will always be otherwise occupied, Aristotle answers that in that case either (1) the capability is not really as they describe it, or (2) in an infinite period the destruction will in fact take place. For eternal objects, Aristotle does seem to accept the principle of plenitude: there are no unrealized capabilities. Cf. especially *GC* II.11, 337^b5 ff., *DC* 281^b3 ff., *Top.*, 115^b14 ff., and *Ph.* 203^b30: *ἐνδέχεσθαι γὰρ ἢ εἶναι οὐδὲν διαφέρει ἐν τοῖς αἰδίοις*. For perishables, the question is more complicated. Aristotle does hold that whatever is perishable will in fact at some time perish (*Top.* 115^b17–18); but he also clearly holds that perishable things can have capabilities that are not, in the course of their existence, realized (cf. especially *DI* 9). The question has been discussed in full by Hintikka.² I do not accept all his arguments, particularly those concerning *Metaph.* IX. 3–4; but it seems correct to find the principle at work in Aristotle's discussions of the destructibility of the universe, including this chapter.³

¹ Diels, *Doxographi*.

² Hintikka, "Aristotle on the realization," 93–113.

³ On *DC* I.10–12, cf. also C. Williams, "Aristotle and Corruptibility."

Whether or not Aristotle has argued convincingly against his opponents remains unclear, since we know so little about them and their arguments. If they claimed (a) that their forces were capable of destroying the universe, but (b) that they never would, then a supporter of plenitude must convict them of inconsistency. But perhaps they argued that their "overwhelming forces," though quantitatively of such a magnitude as to cause destruction, were not in fact capable of destroying because they must always, of necessity, be acting in some other way. Aristotle's failure to make a clear distinction between logical and physical necessity leads him to omit this alternative, and to suppose that if they did not view destructibility as a genuine conceptual contradiction—like the man standing and sitting at the same time—they must have allowed it as a real possibility.

22-23. *κατὰ τοῦτον τὸν λόγον*. That is, any view which, like the Atlas view, allows the possibility of a powerful motive force within the universe besides the naturally moving elements and self-moving living creatures. If the heavens are moved by a moved mover in the system, it will be both natural and possible (*πέφυκε καὶ ἐνδέχεται*) that its force should be superior to that in virtue of which the earth remains at rest and those in virtue of which fire and *aithēr* are moved.

25. *τὸ ἄνω σῶμα*. This must be the *aithēr*. Forster alone of modern editors disagrees, interpreting it as the region between the air and the moon. He cites in evidence *Meteor.* 340^b6-7, where such is the interpretation given by Webster and Ideler⁴ to the passage: *τὸ μὲν γὰρ ἄνω καὶ μέχρι σελήνης ἕτερον εἶναι σῶμά φαμεν πυρὸς τε καὶ ἀέρος*. But Lee⁵ has argued convincingly that this passage, too, refers to the *aithēr* and that *μέχρι* should be taken to mean "as far down as." The passage is read this way by Alexander, Philoponus, and Olympiodorus, and, more recently by Heath.⁶ One might also cite in evidence the use of *τὸ ἄνω στοιχεῖον* for the *aithēr* at 341^a2-3: *τὸ μὲν γὰρ πῦρ τῷ ἄνω στοιχείῳ, τῷ δὲ πυρὶ ὁ ἀήρ συνεχὴς ἐστίν*. There seems to be

no good evidence that *τὸ ἄνω σῶμα* or a similar phrase was used by Aristotle for anything else but the *aithēr*. As positive evidence, commentators (Farquharson, Torracca, Louis) cite *DC* 270^b22: *αἰθέρα προσωνόμασαν τὸν ἀνωτάτω τόπον*. Farquharson adds the disputed *Meteor.* passage, *De Mundo* 392^a5, which does not help as evidence, and *GA* 736^b29, which does not seem apposite.) Strangely enough, no critic cites either *Meteor.* 341^a3 or, the clearest evidence of all that Aristotle uses *τὸ ἄνω σῶμα* to mean the fifth body, *DA* 418^b7 ff.: *οὐ γὰρ ἢ ὕδωρ οὐδ' ἢ ἀήρ διαφανές, ἀλλ' ὅτι ἐστὶ τις φύσις ἐνυπάρχουσα ἢ αὐτῇ ἐν τοῖς ἀμφοτέροις καὶ ἐν τῷ αἰθέρι τῷ ἄνω σώματι*. And 418^b11: *... ὅταν ἢ ἐντελεχέα διαφανές ὑπὸ πυρὸς ἢ ποιούτου οἷον τὸ ἄνω σῶμα*. The designation of the *ἄνω σῶμα* as *αἰθέρ* shows clearly that the *aithēr* is in question. It is, furthermore, crucially important to the *MA* 4 argument that *aithēr* is the body concerned: the mutual "destruction" of the sublunary elements is admitted by Aristotle, and constitutes no threat to his picture of the eternity of the universe. But he could not admit that the *aithēr* would enter into this process of change and dissolution (cf. *DC* I.3).

25-26. *εἰ μὲν οὖν . . . ὑπ' ἀλλήλων*. This passage is cryptic and obscure. What seems to be meant is that if there is within the universe a mover who can exert a force greater than the inertia of the earth or the natural motions of fire and *aithēr*, all these can possibly be moved from their natural places so that they will annihilate each other. (Cf. Michael 110,13: *ἐστὶ δὲ τὸ λεγόμενον, 'εἰ μὲν οὖν εἰσιν ἐκ τῶν ὄντων καὶ ὑπαρξιν ἐχόντων δυνάμεις τινὲς μείζους τῶν τοῦ οὐρανοῦ καὶ τῆς γῆς δυνάμεων, κινήσουσι νῦν ἢ αὐριοι ἢ ὅλως ποτέ καὶ φθείρουσι τὸν κόσμον*.' Michael takes *ὑπ' ἀλλήλων*, however, to refer to the interaction of forces and bodies: earth will be annihilated by a force stronger than its own, etc. It is doubtful that *ἀλλήλων* can bear this construction.) Aristotle is picturing the hypothetical mover as corporeal, since he goes on to argue that its force cannot be infinite, there being no infinite body. So presumably he is entertaining *pro tempore* the possibility of a "sixth body": if it is possible for there to be a body different from the natural five, which imparts motion to them all, it is possible for the whole to be

⁴ Webster, tr., *Meteorologica*. Ideler, ed., *Aristotelis Meteor.*

⁵ Lee, ed., *Meteorologica*.

⁶ Heath, *Aristarchus* 228.

destroyed. His own picture of a bodiless mover exerting infinite force outside the system is not subject to this objection.

Forster gives a strange account of the passage: "These overpowering motive forces might exist and be dissolved by one another, because if they can be dissolved, they are not infinite, and the reason why they are not infinite is that they act upon what is finite, and the infinite cannot act on the finite (*DC* 274^b23 f.)." First of all, it looks as though he is reading *ταῦτα* as referring to the *κινήσεις*, whereas it clearly refers to the elements mentioned previously. Second, he seems in consequence to misconstrue the point about the *ἄπειρον*. This is a parenthesis: if it is possible for there to be overwhelming forces (it is not possible for them to be infinite, but we just need for the argument to claim that they are superior to the natural motions of the elements), the following consequences will ensue. The reason why they cannot be infinite seems to be the point made in *Ph.* III.5 and VIII.10 and referred to above at 699^b16–17: no body can be infinite, and no finite body can exert infinite force. The passage of the *DC* to which Forster refers is just part of a proof that there can be no infinite body and is a *reductio* argument involving the assumption of an infinite body. It does not show that an infinite *force* (given that its source is not bodily) cannot move what is finite. *Ph.* VIII.10, in fact, shows that it takes infinite force to go on moving the finite heavens.

27–28. *ἄπειρον γὰρ . . . ἄπειρον εἶναι*. Cf. the preceding note, the note on 699^b14–17, and *DC* I.5–7.

28–29. *ἐνδέχεται ἂν διαλυθῆναι τὸν οὐρανόν*. Cf. the note on 699^b22.

31. *ἀλλὰ περὶ μὲν τῆς ἀπορίας ταύτης ἕτερος ἔστω λόγος*. The sequence of the argument in this and the following paragraph seems peculiar, suggesting that this section of the treatise was left in a less polished form than the rest. Aristotle indicates here that a full discussion of the indestructibility of the universe and of the nature of its mover must be found in other works—i.e., in *DC* I and in *Ph.* VIII. But with the opening of the next paragraph, he goes right on with the same question: must the

mover of the heavens be unmoved? Having used a Homeric example to illustrate the absolute immobility of his mover, he immediately concludes, "Here's a solution to the difficulty we were in a while ago"—the same difficulty, apparently, that he had put off for another discussion. Michael records a variant reading of *δύεται* for *λύεται* at 700^a4, interpreting: "Because of our unclarity on this question about the unmoved mover, we got ourselves into difficulty" (112, 3 ff.). So commentators apparently sensed the difficulty of making Aristotle propose only ten lines later a solution to a problem he had postponed for another *λόγος*. (The use of *ἡ πάλαι λεχθεῖσα*, which seems to add to the difficulty (cf. *Ph.* 222^b14: *πάλαι δὲ τὸ πόρρω*), is not really a problem. Despite the *Physics* definition, *τὰ πάλαι λεχθέντα* is used in *Pol.* 1262^b29 to refer back to 1262^a25–30; at 1282^a15 *ὁ πάλαι λόγος* refers to 1281^a40–^b21; and at *Ph.* VIII.5, 254^a16, *οἱ πάλαι λόγοι* refers either to VIII.1, or, in Ross's opinion more likely, to 252^a5–32.

What seems to have happened is this: Aristotle, unwilling to involve himself in a repetition of *DC* arguments about indestructibility and eternity and the full *Physics* demonstration that the eternity of motion is to be guaranteed by an unmoved mover, refers us to these works for further consideration of the problem. He then goes back to the particular question that had prompted his remarks about destructibility, the question with which chapter 3 began: must there be in the case of the heavens, as in that of animals, something unmoved that is outside the moved and is no part of it? By now this question also means, "Is the origin of motion for the heavens an unmoved something outside the universe?" This Aristotle indicates at 699^b34–35 with *ἴσως γὰρ ἂν δόξειεν ἄτοπον εἶναι, εἰ ἡ ἀρχὴ τῆς κινήσεως ἐντός*. He believes that he has shown that any solution involving an origin of motion within the system, as well as any solution that makes the mover "push off" against something in the system, involves us in the paradox that the universe that we say is necessarily indestructible will be potentially destructible. Instead of offering a lengthy account of the nature of this external mover—this he has left to *Physics* VIII—he uses the

Homer illustration briefly to indicate what he has in mind and to suggest a fitting answer to those who, like the Atlas theorists, offer faulty anthropomorphic accounts of the workings of the heavens. Aristotle concludes by saying that it is from a theory involving an entirely unmoved mover (N.B. *ᾠθεν*), the theory elaborated more fully in *Physics* VIII, that we can hope to get a solution to our problems about the heavens.

34-35. ἵσως γὰρ ἂν δόξειεν ἄτοπον εἶναι. This is not a new point, but a summary of the result of the preceding discussion of various possibilities for having a mover within the system. The tentative ἵσως probably indicates Aristotle's recognition that the arguments, in order to convince, must be considered along with material from other works. It certainly need not be read as indicating doubt about the validity of the conclusion. (Cf. Bonitz, *Index*, 347^b32: sed saepe ἵσως non dubitantis est, sed cum modestia quadam asseverantis.)

35-36. τοῖς οὕτω ὑπολαμβάνουσιν. This might mean either that to those who think it paradoxical for there to be an internal mover, Homer's description of the mover as unmoved would seem correct, or that, to those who suppose the mover is within the system, Homer's objection that you cannot move Zeus would seem to be well addressed. (Michael opts for the first; others are ambiguous.) The second reading seems to me more likely, as containing a collective back-reference to the thinkers whose views have been discussed in this section, and as according well with Aristotle's rhetorical use of a Homer quote to scold the opposition in *Metaph.* XII.10, 1076^a3: τὰ δὲ ὄντα οὐ βούλεται πολιτεύεσθαι κακῶς· οὐκ ἀγαθὸν πολυκοιρανίῃ· εἰς κοίρανος ἔστω.

37-700^a2. The citation is from *Iliad* VIII 20-22. In the *textus receptus* of Homer, the line beginning πάντες precedes the other two. Zeus warns the other gods not to defy his authority and challenges them to a tug of war with a golden chain as a demonstration of his superior strength:

εἰ δ' ἄγε, περήσασθε, θεοί, ἵνα εἴδετε πάντες,
σειρὴν χρυσείην ἐξ οὐρανόθεν κρεμάσαντες·

πάντες δ' ἐξάπτεσθε θεοὶ πᾶσαι τε θέαιναι·
ἀλλ' οὐκ ἂν ἐρύσαιτ' ἐξ οὐρανόθεν πεδίοις
Ζῆν' ὑπατον μήστωρ, οὐδ' εἰ μάλα πολλὰ κάμοιτε.

There appears to be a reference to these lines in *Theaetetus* 153 c, where Socrates claims that by the golden rope Homer actually means the sun, and that the point of the passage is to show that the continual regular motion of the heavens is necessary to preserve order in the universe. Aristotle may have that passage in mind; he would then be insisting that continual motion is not enough, and that this very passage can actually be used as support for his view of the cosmos.

Apparently quoting from memory, Aristotle transposes the order of the lines and replaces the ὑπατον μήστωρ of the *textus receptus* (also at *Il.* XVII 339) with ὑπατον πάντων, a formula not actually found anywhere in Homer.⁷

The example is in some respects inappropriate, since Zeus is neither outside the heavens nor ὅλως ἀκίνητον. He seems, in fact, to be the kind of anthropomorphic being with superior force within the system that Aristotle has rejected in the preceding arguments. But it is included for rhetorical effect, possibly also to score a point against Plato. As with the *Metaph.* XII passage cited, we are not meant to look too closely at the context.

3. τὸ γὰρ ὅλως . . . κίνηθῃναι. What is entirely unmoved (i.e., never moved) cannot possibly be moved: another instance of the principle that, for eternals, "never" implies "impossible."

3-6. ᾠθεν . . . ἀρχῆς. The ἀπορία is just, is it possible for the heavens to be destroyed? Or rather, since we know it is impossible, how can we characterize their motions so as to exclude this possibility? εἰ . . . ἀρχῆς is not a part of the πότερον question, but exegetical of ᾠθεν. Farquharson's translation captures this point well, and I have, in outline, followed it here.

7-11. ἐπὶ δὲ . . . θάτερον. A recapitulation of the discussion

⁷ Wachsmuth, *De Aristotelis Studiis Homericis*, contains a general discussion of Aristotle's use of Homer. Wachsmuth discusses this passage on pages 6-7. Cf. also Bonitz, *Index*, 507 a-b.

of joints in chapter 1, as well as a pointer forward to the further consideration of these problems in chapters 8–9. Unlike the heavens, which have no internal division into mover and moved, animals must have parts and have bodies suitably articulated for this kind of motion. The punctuation here follows a suggestion made by Düring.⁸ For a full discussion of problems with the standard version (and with Düring's retention of αὐτοῦ in 1. 8) see *HSCP*, 143.

11. περὶ δὲ τῶν ἀψύχων ὅσα κινεῖται. Aristotle asks whether the lifeless elements share with self-moving animals the requirement that, for motion, there must be both the internal division into moving and moved and the external unmoved. In some discussions of nature and motion (notably in *Physics* II), the elements are grouped with animals and plants as bodies that have an internal source of motion or change. In *Physics* VIII, however, Aristotle denies that they are, in the strictest sense, self-moving. Self-moving animals are, he argues, ultimately the source of the motion of these lifeless bodies (256^a1–2). No element is really a self-mover, and if the elements do have an internal principle of change, it is a passive, not an active principle (225^b29–31).

These arguments are, as they stand, somewhat obscure. But Aristotle's aim in setting up these distinctions can be inferred from an analysis of other sections of *Physics* VIII and parts of *EN* III (cf. note on 703^b2, and Essay 1). A genuine self-mover is a creature whose movement is best explained with a teleological account mentioning the agent's subjective awareness (his *phantasia*—cf. Essay 5) of the goal. But changes in lifeless bodies—the elements and their compounds—can be explained with reference only to the underlying matter. This distinction is already found at the end of *Ph.* II (198^b18, 200^a1–5), and Aristotle seems to maintain it consistently throughout his career (cf. especially *Metaph.* 1044^b12, *APo* 95^a1–2, and especially *Meteor.* 378^b31–34, where natural change in elemental bodies is said, as in *Physics* VIII, to be explained by a passive power of the matter. This passage of the *MA* is one of the clearest pieces

of evidence that Aristotle did not wish his teleological explanatory model to be applied to the lifeless elements.

14–16. ἡ ἀδύνατον . . . ἀλλ' ὑφ' ὧν ταῦτα κινεῖται πρῶτων. ἀλλ' is the reading of all the manuscripts (except P, which has ἀλλὰ). Jaeger incorrectly (following Bekker—cf. Part I, chapter 2) claims that EYSM^aM^p read ἀλλ' and then writes “ἀλλ' scripsi.” The reading ἀλλ', actually nowhere attested, is retained by Bekker and Louis.

The meaning is, “Do the elements, too, have something at rest both within and without, or is this impossible, and is it not rather the first movers of these lifeless bodies in whom we must look for the division into mover and moved, and the external resistance?” The next sentence explains the impossibility of treating elements like animals: they are, unlike animals, all moved by something else (cf. 700^b6: ἐπεὶ δὲ τὰ ἀψύχα πάντα κινεῖται ὑφ' ἑτέρου). It is further explained that the source of their motion is the motion of self-movers.

17–18. τῶν δὲ τοιούτων περὶ μὲν τῶν ζώων εἴρηται. The other major class of self-moving beings is that of the heavenly spheres (cf. also *Ph.* 259^b1–3: ὁρῶμεν δὲ καὶ φανερώς ὄντα τοιαῦτα ἃ κινεῖ αὐτὰ ἑαυτά, οἷον τὸ τῶν ἐμψύχων καὶ τὸ τῶν ζώων γένος). This passage indicates that the nature of their self-motion and the comparison between that and animal motion will continue to be an important theme in the treatise. (Michael's suggestion (112, 12–14) that τοιούτων means all movers, including the ἀψύχα, seems impossible.) The motion of the spheres has already been discussed to some extent, of course, along with animal motion; but the point here seems to be that whereas in the case of animals we have become clear about the necessary conditions for their motion and need to go on to a discussion of their goals, in the case of the spheres the two cannot be separated; so it is only with the discussion of the object of desire as unmoved mover that we can succeed in establishing any positive conclusions about the heavens. For further remarks on this passage, cf. Essay 2.

20–21. εἰ δέ τι ἐστὶν ἀνωτέρω . . . ἀρχῆς. This seems to point ahead to the second major division of this treatise, where Aristotle will discuss how a creature is moved by its object of

⁸ Düring, *Gnomon*, 417.

desire. The $\delta\epsilon$ does not, then, correspond to the $\mu\epsilon\nu$ of line 18, but adds a further point about animals: We have spoken about the self-motion of animals by explaining the necessary conditions for their motion. But we have still left it unclear what it is that imparts motion in a primary way—i.e., the final cause of their motion. This sort of $\alpha\rho\chi\eta$ requires a further discussion. The passage does not refer in particular to the prime mover (as is claimed by Farquharson and Jaeger⁹), although it does, insofar as the prime mover imparts motion as an object of desire. The scribe of S, feeling the difficulty of the $\alpha\delta\eta\lambda\omicron\nu$ if the sentence were taken to refer to the prime mover, wrote $\epsilon\upsilon\delta\eta\lambda\omicron\nu$.

23. $\kappa\alpha\iota \alpha\nu\alpha\pi\nu\epsilon\omicron\nu\tau\alpha \kappa\alpha\iota \epsilon\kappa\pi\nu\epsilon\omicron\nu\tau\alpha$. Respiration is discussed again in chapter 11, as a non-voluntary movement. There it is claimed that in such processes the involvement of the goal-directed faculties is not the same as in genuine local motion towards an object; but according to this passage, the same internal articulation and the same external conditions are required. Cf. also *Ph.* 243^b12: $\epsilon\tau\iota \delta' \eta \mu\epsilon\nu \epsilon\iota\sigma\pi\nu\omicron\eta \epsilon\lambda\lambda\epsilon\iota\varsigma, \eta \delta' \epsilon\kappa\pi\nu\omicron\eta \omega\sigma\iota\varsigma. \delta\mu\omicron\iota\omega\varsigma \delta\epsilon \kappa\alpha\iota \eta \pi\tau\upsilon\sigma\iota\varsigma, \kappa\alpha\iota \theta\sigma\alpha\iota \alpha\lambda\lambda\alpha\iota \delta\iota\alpha \tau\omicron\upsilon \sigma\acute{\omega}\mu\alpha\tau\omicron\varsigma \eta \epsilon\kappa\kappa\rho\iota\tau\iota\kappa\alpha\iota \eta \lambda\eta\pi\tau\iota\kappa\alpha\iota \kappa\iota\nu\eta\sigma\epsilon\iota\varsigma$ · $\alpha\iota \mu\epsilon\nu \gamma\alpha\rho \epsilon\lambda\lambda\epsilon\iota\varsigma \epsilon\iota\sigma\iota\nu, \alpha\iota \delta' \alpha\pi\acute{\omega}\sigma\epsilon\iota\varsigma$.

⁹ Jaeger, "Pneuma," 34.

CHAPTER 5

In this brief chapter, Aristotle asks whether his findings about local motion can be applied as well to other sorts of change. Turning first to the case of $\gamma\epsilon\nu\epsilon\sigma\iota\varsigma$, he observes that his arguments (in *Physics* VIII and elsewhere) about the priority of local motion would clearly show us that $\gamma\epsilon\nu\epsilon\sigma\iota\varsigma$ and $\varphi\theta\omicron\rho\acute{\alpha}$ of a creature are dependent on the prior local motion of the parent organism. Furthermore, in any completed creature, local motion is prior to all the other sorts of change, so that our findings about the requirements for growth and qualitative change depend on our findings about local motion: if there must be something at rest for local motion, *a fortiori* there must be something at rest for any of the others to go on. But in the incomplete organism, the early growth and alteration is dependent not on the local motion of the creature itself, but on that of its parent. The chapter concludes the first section of the inquiry, expanding the analysis of motion's necessary conditions to cover all sorts of change.

The problems of text and especially of punctuation in this chapter are extremely complex. Since it is primarily a recapitulation of other discussions, its style is especially cryptic. Michael's discussion is helpful, as is Farquharson's, which is largely based on it.

27–28. $\eta \kappa\alpha\iota \epsilon\nu \tau\bar{\omega} \alpha\lambda\lambda\omicron\iota\omicron\upsilon\mu\epsilon\nu\omicron\nu \alpha\upsilon\tau\bar{\omega} \upsilon\varphi' \alpha\upsilon\tau\omicron\upsilon \kappa\alpha\iota \alpha\upsilon\lambda\alpha\nu\omicron\mu\epsilon\nu\varphi$. Aristotle distinguishes, in the *Cat.*, the following species of change: $\gamma\epsilon\nu\epsilon\sigma\iota\varsigma$, $\varphi\theta\omicron\rho\acute{\alpha}$, $\alpha\upsilon\lambda\eta\sigma\iota\varsigma$, $\mu\epsilon\iota\omega\sigma\iota\varsigma$, $\alpha\lambda\lambda\omicron\iota\omega\sigma\iota\varsigma$, and $\kappa\iota\nu\eta\sigma\iota\varsigma$ *κατὰ τόπον* (15^a13). More often, he employs a fourfold classification: *κατὰ τὴν οὐσίαν* or *κατὰ τὸ τί* ($\gamma\epsilon\nu\epsilon\sigma\iota\varsigma$ and $\varphi\theta\omicron\rho\acute{\alpha}$), *κατὰ τὸ ποῖόν* ($\alpha\lambda\lambda\omicron\iota\omega\sigma\iota\varsigma$), *κατὰ τὸ πᾶν* ($\alpha\upsilon\lambda\eta\sigma\iota\varsigma$ and $\varphi\theta\iota\sigma\iota\varsigma$), and *κατὰ τόπον* (cf. *Metaph.* 1069^b9–13, 1088^a31–33; *GC* 317^a25–26, 319^b31–320^a2, 320^a12–15; *Ph.* 243^a8–10, etc.). The most detailed discussion of the sorts of change and how they differ from one another is to be found in *GC* I.3–5.

28–29. $\pi\epsilon\rho\iota \delta\epsilon . . . \alpha\lambda\lambda\omicron\varsigma \lambda\omicron\gamma\omicron\varsigma$. The question about $\gamma\epsilon\nu\epsilon\sigma\iota\varsigma$

is separated from the one about growth and qualitative change because, as we are later told, nothing is the reason for its own *γένεσις* or *φθορά*, whereas the creature does, at a certain point in its career, become responsible for its own growth and *ἀλλοίωσις* (cf. *GA* II.1, 735^a13–14: οὐθέν γὰρ αὐτὸ ἐαυτὸ γεννᾷ· ὅταν δὲ γένηται, αὔξει ἢ δὴ αὐτὸ ἐαυτό). In both cases, Aristotle means to show the dependence of this change on local motion, and, in consequence, that if something at rest is required for the one it is required as well for the others. But the proof in the case of *γένεσις* depends only on the observation that local motion of another creature is prior to *γένεσις* of this creature, whereas for the other two we must establish as well that local motion is prior in the completed functioning of each individual creature: hence the supplementary remarks at 31–32.

29–31. εἰ γὰρ ἐστὶν . . . ἴσως πασῶν. This difficult passage has been given two types of interpretations. Some commentators take Aristotle to be arguing that the change that is *γένεσις* or *φθορά* is the *πρώτη κίνησις*, and that this is the *αἰτία* as well of all the other motions. This is the view of Burley and Albertus, and is indicated to be Jaeger's by his punctuation: *πρώτην κίνησιν γενέσεως καὶ φθορᾶς, αὕτη αἰτία ἂν εἴη, καὶ τῶν ἄλλων δὲ κινήσεων ἴσως πασῶν*. (Bekker has the same punctuation, but reads *πρώτη κίνησις*.) This interpretation has several defects: (1) It is inconsistent with Aristotle's only lengthy discussion of what is, in fact, the "first motion," in *Ph.* VIII. 7 (cf. especially 261^a7–10: ἐπεὶ δὲ γένεσιν ἀδύνατον εἶναι πρώτης (πάντα γὰρ ἂν εἴη τὰ κινούμενα φθαρτά), δῆλον ὡς οὐδὲ τῶν ἐφεξῆς κινήσεων οὐδεμία προτέρα). (2) It would leave nothing proved, since no resting point can be shown to be necessary for generation without the argument from the priority of local motion. Burley admits this, and supplies this argument in a strange reading of 31–32. (3) It leaves *αὕτη αἰτία ἂν εἴη* hanging, unless *καὶ* is read as "even" or "also," which would imply that *γένεσις* and *φθορά* were the *αἰτία* of these as well as of local motion—which is clearly wrong. Jaeger's punctuation does not allow even this dubious recourse, and it is hard to see what he has in mind.

The other, more promising, possibility is that *πρώτη κίνησις* is local motion (a reference being intended, with *ἥνπερ φαμέν*, to *Ph.* VIII.7) and that it is here argued to be the *αἰτία* of *γένεσις* and *φθορά*, as well as of the other sorts of change. So the passage is read by Farquharson, Forster, Louis, and Torraca, all following, presumably, the excellent discussion of Michael:

He now continues, *εἰ γὰρ ἐστὶν ἥνπερ φαμέν πρώτην κίνησιν γενέσεως καὶ φθορᾶς*, by *πρώτην κίνησιν* meaning motion from place to place. For *Physics* VIII showed this was prior to the others; and of this sort of motion the primary species is circular motion. What he is saying here is, "If motion from place to place is prior to coming-to-be and to alteration, and these are prior to growth, and if without motion from place to place there can be neither coming-to-be nor any other kind of change, and if motion from place to place cannot occur without something at rest, neither can these other sorts of change take place without something at rest" (113, 3 ff.).

The discussion of the priority of local motion in *Ph.* VIII.7 is very important for the connection between the *ἀπορίαι* of VIII concerning animal motion and the attempted resolution of these in the *MA*. Two passages in *Ph.* VIII (253^a11 ff., 259^b11 ff., cf. of Essay 2) argue that non-local motions in the animal are caused by the environment, and hence are no problem for the argument against self-motion. Local motion is the only genuine self-motion in animals. But *Ph.* VIII.7 argues that local motion is prior to all these others: hence they once again look problematic; and whatever the *MA* concludes about the local motion of animals will influence its conclusions about the other sorts of change.

Ph. VIII.7 claims for local motion priority in (a) separate existence, (b) time, and (c) essence, over both *ἀλλοίωσις* and *αὔξησις*. (*γένεσις* is not discussed in the initial enumeration, but later—261^a7, cited above; and the *GA* makes clear the priority, both temporal and explanatory, of the parent's local motion.) *αὔξησις* is shown to be dependent on *ἀλλοίωσις*, *ἀλλοίωσις* on condensation and rarefaction, hence local motion (260^a29–^b15).

Aristotle then enumerates the various senses of *πρώτη* (cf. *supra*), telling how *φορά* is prior in each of these. He concludes that local motion is the primary kind of self motion: *μάλιστα δὲ δῆλον ὅτι τὸ κινεῖν αὐτὸ αὐτὸ μάλιστα ταύτην κινεῖ κυρίως, τὴν κατὰ τόπον*.

31-32. *ὥσπερ δ' ἐν τῷ ὅλῳ, καὶ ἐν τῷ ζῳῳ . . . ὅταν τελεωθῇ*. In the case of eternal things, local motion is primary *simpliciter*. In the case of perishable creatures, local motion is primary (1) because the parent's local motion explains the coming-to-be of the offspring—cf. *GA* II.1—and, it is now claimed, (2) because once the creature reaches completion it is again the primary motion on which the others depend and with reference to which they are to be explained. Aristotle would argue in general that the process of growth is to be explained with reference to the complete functioning to which it tends (cf. Essay 1 and references there). Both points are made in a passage from the argument from temporal priority in *Ph.* VIII.7, 260^b30 ff.:

ἀλλ' ἐφ' ἐνὸς μὲν ὁτοῦν τῶν ἐχόντων γένεσιν τὴν φορὰν ἀναγκαῖον ὑστάρτην εἶναι τῶν κινήσεων· μετὰ γὰρ τὸ γενέσθαι πρῶτον ἀλλοίωσις καὶ αὔξεις, φορὰ δ' ἤδη τετελειωμένων κινήσις ἐστίν, ἀλλ' ἕτερον ἀνάγκη κινούμενον εἶναι κατὰ φορὰν πρότερον, ὃ καὶ τῆς γενέσεως αἴτιον ἔσται τοῖς γιγνόμενοις, οὐ γιγνόμενον. . . .

Cf. also *GA* 735^a12, cited in note on lines 28-29, and 740^a25. For Aristotle's technical use of *τελειοῦσθαι* for the being-brought-to-completion of an organism, cf. also *PA* 646^b10, *GA* 752^b18, 767^a22, 774^b6, *et al.* An animal is complete at birth if it is able to function on its own to at least some extent, e.g., to begin to nourish itself (in other words, to be "responsible for its own growth"). This it can do only if its prenatal nourishment has been brought to completion (see *GA* 752^b17, 774^b5 ff.).

Louis, with Platt,¹ reads 31 *ὥσπερ . . . 33 ἀλλοίωσις* as a question: is there this first movement in the developing animal, as in the universe, so that it becomes the cause of its own growth and qualitative change? But (1) nothing in the wording of the

passage suggests this is a question. (2) Louis's "au fur et à mesure que celui-ci se forme" for *ὅταν τελεωθῇ* ignores the obvious force of the aorist passive. (3) The whole interpretation seems to miss the point of the passage. Platt and Louis take the point to be that if local motion is primary in the animal we can say it is responsible for its own growth; but if it is not primary, then there is no reason to say it causes its own growth, but we should rather say that the first growths and alterations are due to external causes ("Si ce n'est pas le cas, il n'est pas nécessaire qu'il soit cause de sa propre croissance, et les origines du développement et de l'alteration se situent ailleurs et sont dues à d'autres causes."). This misses the clear temporal opposition between *ὅταν τελεωθῇ* and *αἱ δὲ πρώται αὐξήσεις*, making these contemporaneous, and fails to distinguish between chronological and explanatory priority. We are never clear what sense of "prior" Platt and Louis have in mind; but *Ph.* 260^b30 ff. makes it seem important to insist on the distinction. And, above all, the Platt-Louis view gets us no nearer to establishing the necessity for something at rest—the avowed purpose of the chapter.

32-33. *ὥστε καὶ αὐξήσεως, εἴ ποτε γίνεταί αὐτὸ αὐτῷ αἴτιον, καὶ ἀλλοιώσεως*. The argument runs: (1) If there is a first motion, it is the cause of *γένεσις* and of all other changes. (2) There is a first motion in each mature animal, just as in the universe (i.e., local motion). (3) So once the animal reaches a point of development (if it ever does) at which we can say its growth and qualitative change are self-caused, not caused by the parent, local motion will be the cause of these changes as well (as of *γένεσις*). I am following the punctuation and translation of Farquharson, which seem to make the best sense of the argument. *αὕτη αἰτία ἂν εἴη* must be supplied from 700^a30; but this is not odd in this condensed and obscure passage. Forster and Louis take *αὔξεις* to be the subject of *γίνεταί*, after which they place a comma; but this makes the phrase parenthetical and otiose.

33-34. *εἰ δὲ μή, οὐκ ἀνάγκη*. If the first movement is as we have said it is, and given, furthermore, that it is the first move-

¹ Platt, "Notes," 298.

ment in the completed organism, all change will ultimately be dependent on this, and hence something at rest will be required for all sorts of change. But if this is not so, it will not be necessary that there be something at rest. Michael writes:

εἰ δὲ μή, οὐκ ἀνάγκη—that is, if movement from place to place is not prior to the other kinds, there is no necessity for there to be something at rest in things which alter and grow by their own agency. But, as has been shown, it is prior. Therefore there is something at rest in these too (113,11).

For the Platt-Louis version of this sentence, cf. *supra*. Torraca strangely brands this and the following sentence as an interpolation, rejecting Michael's solution as "arbitraria ed errata."

34-700^b3. αἱ δὲ πρώται αὐξήσεις . . . πρότερον οὐδὲν ἐστίν. Aristotle reemphasizes that from a chronological point of view the immediate cause of a developing creature's growth is in fact external: the earliest growth and alteration is traceable to the parent. Cf. *DA* 416^b9-20 (16:γεννᾶ δ'οὐθὲν αὐτὸ ἐαυτό, ἀλλὰ σῶζει), *GA* 735^a13-14 (cited in note on lines 28-29), *supra*), and 740^a25: διὸ χρήται τῇ ὑστέρα καὶ τῇ ἐχούσῃ, ὥσπερ γῆ φυτὸν, τοῦ λαμβάνειν τροφήν, ἕως ἂν τελεωθῇ πρὸς τὸ εἶναι ἤδη ζῶον δυνάμει πορευτικόν.

CHAPTER 6

In this chapter Aristotle begins his teleological explanation of animal motion. He indicates by back-references the connection between this study of animal motion and previous writings on the elements and on heavenly motions. Having emphasized that all motions of living creatures are for the sake of some end, he enumerates the psychic faculties that are of importance in the teleological explanation of motion: these can be grouped as types of cognition and types of desire. The chapter concludes with a contrast between heavenly motion and animal motion and with a further contrast between the activity of goal-directed living beings and that of the unmoved mover.

This chapter is discussed at length in several of the essays. Essay 1 analyzes the general claims made here about the priority of teleological explanation in explaining animal behavior; Essay 4 indicates in more detail how the division of psychic faculties presented here prepares the way for chapter 7's account of the practical syllogism. The connection between this section of the treatise and the earlier chapters is outlined in Essay 2. Essay 3 discusses the view of soul and body to be found in this and succeeding chapters and indicates the way in which the contrast and comparison between heavenly and animal motions prepare the discussion of *pneuma* in chapter 10. For the role played by *phantasia* in this and succeeding chapters, see Essay 5.

700^b4. περὶ μὲν οὖν ψυχῆς. This is the first mention of *ψυχή* in the treatise. The back-reference is to the discussion of soul-motion in *DA* I.3-4.

6. ἐπεὶ δὲ τὰ ἀψυχὰ πάντα κινεῖται ὑφ' ἑτέρου. Cf. chapter 4, 700^a11 ff., and notes and references there. The reference proves significant in introducing the problems of animal physiology that will be explored in chapter 10—cf. Essay 3.

7-9. περὶ δὲ . . . φιλοσοφίας. The reference is to *Metaph.* XII.7, where the first mover is said to move the heavens as an object of desire (1072^a26 ff., ^b3-4). The comparison with the

motion of animals by their objects will be developed below, 700^b29–32.

12. τὰ ἐμψυχα αἴτια τῆς κινήσεως. The use of ἐμψυχα here, rather than ζῶα, indicates that Aristotle is here thinking as well of the heavenly spheres: cf. chapter 4, 700^a17–18, chapter 10, 703^a6, 9, and notes *ad loc*; also the comments on these in Essay 3. Note that before introducing the divisions of psychic faculties, Aristotle switches from ἐμψυχα to ζῶα (15 ff.). As chapter 4 has emphasized, even the apparently mechanical interaction of lifeless bodies must be explained with reference to the activities of self-movers. ὅσα . . . ἀλλήλοις here does not mean to set up a class of lifeless beings for which this does not hold. If some motions are proximately caused by mutual impact, ultimately self-movers must play a role in the explanation (cf. 700^a11 ff.).

13–14. διὸ καὶ πέρας . . . ἐμψύχων. Teleological explanation is, in a sense, basic to our understanding of the motions even of non-living bodies—but only because these motions are, ultimately, explained with reference to the living, for whose self-maintaining activity a teleological account is the most appropriate (cf. Essay 1).

It is claimed here that the motions of all ἐμψυχα have πέρας. At 700^b31–32, it is claimed that the difference between heavenly and animal motions is that the spheres are moved eternally, whereas the motion of animals has a πέρας. This could cause difficulty for our claim that the spheres are among the ἐμψυχα in question here. But the apparent problem can be resolved by an appeal to the discussion of the senses of πέρας in *Metaph.* V.17. The sense in question in the present passage is that of the end to which the motion and the action are directed—i.e., the οὐ ἔνεκα (1022^a6–8). The sense in question in 700^b31–32 is, however, a different one: τὸ ἐσχατὸν ἐκάστου καὶ οὐ ἔξω μηδὲν ἐστι λαβεῖν πρῶτον (1022^a4–5). Here all animate motions are said to have a goal. Below it is pointed out that the goal-directed motion of the spheres can go on forever, while that of each animal (τῶν ζώων ἐκάστου, as opposed to the species of animals,

which are eternal) comes to an end. For πέρας in the sense in question here, cf. also *DA* 407^a23: τῶν μὲν γὰρ πρακτικῶν νοήσεων ἐστὶ πέρατα (πᾶσαι γὰρ ἐτέρου χάριν).

15–16. πάντα γὰρ τὰ ζῶα . . . τὸ οὐ ἔνεκα. For Aristotle's views here concerning goals and psychic faculties, cf. Essays 1 and 4.

17. τὰ κινούμενα τὸ ζῶον. There are two generic faculties, *nous* and *orexis*, under which all the faculties we call movers of the animal can be grouped. *Nous* is used generically here for the cognitive faculties (cf. also 700^b24–5 and 701^a7), and *DA* III.10, 433^a9–10). Below, however, when the generic term *kritikon* is used, *nous* is used to designate the rational subspecies: *aisthēsis* and *phantasia* are, there, not types of *nous*, but faculties that “hold the same place as” *nous*. The desiring faculty also has three species: wish, spiritedness, and appetite. The division suggests that both cognition and desire, in some form, must be mentioned in every explanation of action, and that neither is, alone, sufficient to move the animal. (Cf. also note on 701^a4–6 below, which strongly suggests a two-stage operation.) Chapter 6 thus agrees with the anti-Platonist claim of *DA* III.9–10: the most important division to make in preparing an account of animal motion is not the division between rational and non-rational, but a division between cognitive and desiderative, *nous* and *orexis*, each of which has rational and non-rational subspecies. Such a division proves useful in setting guidelines for our explanations: there must be one faculty from each “part of the soul” that is active in order for the animal to be moved towards its goal. The rational and non-rational subspecies have in common the fact that, in an explanation of action, they can, in the language of 700^b20, “hold the same place.”

For a discussion of the omissions from this initial list, and the variant reading in *b*₂, cf. *HSCP*, pp. 143–44. A parallel can be found at *Pol.* 1323^b33–36, where Coray's addition is probably unnecessary.

20. τὴν αὐτὴν τῷ νῷ χώραν ἔχουσιν. The meaning is that these can all fill the same slot in the teleological explanation as *nous*

does (though this turns out not to be strictly accurate—cf. Essay 5). For this transferred sense of *χώρα*, cf. 700^b29, *PA* 645^a25, *Pol.* 1294^a17–19.

20–21. *κριτικὰ γὰρ πάντα*. Farquharson, Forster, and Louis all translate this using “judging” or “judgment.” But *κρίνειν* and *κριτικός* need not have this implication. Torraca’s “*facoltà discretiva*” seems better. All these are faculties which are involved in discriminating or making distinctions. John Cooper has concluded from a careful survey of the uses of *κρίνειν* in connection with *αἴσθησις* in the *DA* that there is no need to interpret it as implying that any kind of explicit or reflective judgment is taking place—and in particular that it need not be associated with “explicit verbal performance or the disposition to such—as indeed we can readily infer from his ascription of *κρίνειν* to animals, despite his rather low estimate of animal intelligence.”² The function of *κρίνειν*—i.e., making distinctions, getting information—is contrasted by Aristotle with wanting, commanding, and other jobs belonging to the *δρεκτικόν*: cf. *EN* 1143^a10 ff., where *φρόνησις* is said to be *ἐπιτακτική*, but *σύνεσις* is *κριτική μόνον*. The opening of *DA* III.9 (432^a15 ff.) remarks that the two faculties that most particularly characterize soul are the *κριτικόν*, *ὁ διανοίας ἔργον ἐστὶ καὶ αἰσθήσεως*, and the activity of local motion. But these are popular distinctions, and Aristotle’s distinction does not imply that the capacity for local movement will not prove to depend partly on the capacity for some cognitive activity.

21. *διαφέρουσι δὲ κατὰ τὰς εἰρημένους ἐν ἄλλοις διαφοράς*. Cf. Essay 5; the reference is to *DA* III.3.

22. *βούλησις δὲ καὶ θυμὸς καὶ ἐπιθυμία πάντα ὁρεῖσι*. This threefold division of *ὁρεῖσις* is found in a number of passages in Aristotle: e.g., *EE* 1223^a26–27: *ἀλλὰ μὴν ἡ ὁρεῖσις εἰς τρία διαιρεῖται, εἰς βούλησιν καὶ θυμὸν καὶ ἐπιθυμίαν*, and *DA* 414^b2: *ὁρεῖσις μὲν γὰρ ἐπιθυμία καὶ θυμὸς καὶ βούλησις*. *EE* 1225^b25 states that if *προαίρεσις* is a form of *ὁρεῖσις* it must be one of

these three. *DA* III.9, 432^b5, criticizing the Platonic divisions, claims that if the bipartite division is used, *ἐπιθυμία* and *θυμὸς* must go in the *ἄλογον*, *βούλησις* in the *λογιστικόν*, but if the tripartite division is used, there will be desire in each part (cf. also *Pol.* 1334^b20 ff.). Can we find more precisely what leads Aristotle to make these distinctions, and what is the meaning of associating one sort with the rational, the others with non-rational capacities?

The distinction made most of by Aristotle is a distinction among the objects of these desires. *βούλησις* has as its object the good, or the end (*Rhet.* 1369^b2–3, *EN* 1111^b26, 1113^a5, ^b3). *Topics* 146^b3–6 calls it a relative term and observes that as such it is correctly defined with reference to its end. (Further, it may be for things not in the agent’s power here and now: *EN* 1111^b19 ff., *EE* 1225^b32 ff.). It would seem likely, then, that the observation that it is “in the *λογιστικόν*” (*Top.* 126^a12–13; cf. *DA* 432^b5), and that motion according to reason is motion according to *βούλησις* (433^a22) should be taken to mean not that *βούλησις* is desire plus reasoning about how to achieve the object, but desire for a privileged object, which must be presented by reason. Hence animals do not have it, though Aristotle would admit that at least some of them could calculate about how to get food; they do have both of the other species (*EE* 1225^b26).

ἐπιθυμία, on the other hand, is said to belong to all creatures with *αἴσθησις*, whether or not they move, just because they feel pleasure and pain (*DA* 414^a4, *Somm.*, 454^b24). It is defined as *ὁρεῖσις* for the pleasant (*Top.* 140^b27; *DA* 414^b5–6; *PA* 661^a8; *Rhet.* 1370^a17, 1369^b15; *EN* 1111^a32, ^b16, 1151^b11–12; *EE* 1223^a34, 1235^b22). This in itself does not serve fully to distinguish the two. For we cannot argue that the good does not appear pleasant to a well-disposed agent; all that Aristotle says about education of the feelings leads us to suppose the well-trained man would take pleasure in doing virtuous actions. Would these then become objects of *ἐπιθυμία*?

A possible solution might be the following: *βούλησις* is a desire for a rationally conceived goal, and, derivatively, for

¹ Moraux, *AntCl.*, 364.

² John Cooper, “Aristotle on the Ontology of the Senses,” read at the Princeton University Conference on Ancient Philosophy 1973, 9–13.

constituents of it and means to it, seen as such. (Hence the remark at *Metaph.* 1072^a27 that the *first* object of βούλησις is the real καλόν.) What is βουλευτόν is ranked and valued as a part of the agent's overall life plan. ἐπιθυμία is a desire for what strikes the agent as pleasant or good here and now (ἐπιθυμητόν μὲν γὰρ τὸ φαινόμενον καλόν). *EN* 1111^a30–31, which speaks of health and learning as appropriate objects of ἐπιθυμία, would be a counter-example only if these were desired *as* constituents of or means to a rationally apprehended end. But they can, of course, also be objects of short-term pleasure-oriented desire, and it is one of the jobs of moral education to make them so. The object of moral education would be to encourage the greatest possible coincidence between the objects of βούλησις and of ἐπιθυμία, so that ἐπιθυμία does not distract from pursuit of the goal; and, in a failure of deliberative calculation, ἐπιθυμία can fill the gap.

The place of θυμός in Aristotle's account is more difficult to explain. It seems to be equivalent to spiritedness or anger (*Rhet.* 1369^a4 replaces it by ὀργή and *EN* 1111^a30–31 associates it with ὀργίζεσθαι). Its object would seem to be revenge, or, more generally, harming one's enemies (cf. *EN* 1116^b24–26 on the association of ἀνδρεία with θυμός). The man under the sway of θυμός listens to reason in a way, but like a bad servant, and rushes too hastily πρὸς τὴν τιμωρίαν (1149^a25–32). Unlike βούλησις and ἐπιθυμία, then, θυμός seems to be explicable only with reference to a past event. Does the man go after vengeance for the sake of the pleasure it affords, or for his honor, or just because of uncontrollable passion arising from the past injury? The last, though it is what Aristotle suggests sometimes, would not explain what its final cause is; but we must conclude that Aristotle nowhere gives a sufficiently clear analysis of the objects of θυμός, of its relation to reason and to pleasure, and of its various types and manifestations.

23. ἡ δὲ προαίρεσις κοινὸν διανοίας καὶ ὀρέξεως. προαίρεσις is mentioned again in the treatise only in passing, at 701^a5; but possibly it or some sub-rational analogue may be the specific ὀρεξις that is correlated with the workings of the σύμφυτον πνεῦμα

and that might be associated with the conclusion of a practical syllogism (cf. Essay 3). What is meant by saying it is κοινὸν διανοίας καὶ ὀρέξεως is, presumably that it is a specific desire for something in our power, growing out of a general desire and a deliberative account of the end—i.e., a specification of it until we reach what it is in our power to do. Cf. *EN* 1113^a10–11: ἡ δὲ προαίρεσις ἂν εἴη βουλευτική ὀρεξις τῶν ἐφ' ἡμῖν. Also 1139^a23, *EE* 1226^b17, *MM* 1189^a31, *EN* 1139^a31: πράξεως μὲν οὖν ἀρχὴ προαίρεσις . . . προαιρέσεως δὲ ὀρεξις καὶ λόγος ὁ ἕνεκά τινος, and 1139^b4–5: διὸ ἡ ὀρεκτικὸς νοῦς ἡ προαίρεσις ἡ ὀρεξις διανοητική.

23–24. ὥστε κινεῖ πρῶτον τὸ ὀρεκτόν καὶ διανοητόν. The first mover, i.e., the goal, has to be an object both of desire and of cognition. All modern editors print καὶ τὸ διανοητόν. But P, the only manuscript with the correct version of this passage—hopelessly truncated and corrupted in all others (cf. *HSCP*, 130–31)—omits the article. William, whose manuscript (earlier than the fourteenth century P) evidently drew on the same independent tradition for this passage, translates, “quare movet primum quod appetibile et quod intellectuale”—which possibly indicates that he found the article before διανοητόν as well. But this leaves an ambiguity: it is unclear whether both cognition and desire are required. The rest of the chapter, together with *DA* III.9, makes it clear that they are, and so it seems clearer to keep the reading of P: the first mover is the object of desire, being also an object of cognition. We must, however, acknowledge that nothing so strong has been argued for in the chapter so far; if we omit τὸ, Aristotle is anticipating his conclusion and leaving a gap in the argument. If, however, we keep it, he seems positively to mislead us concerning the nature of his conclusion. It seems preferable, then, to omit it, following the stronger MS authority. The second τὸ, if not a flourish of William's, may be an alteration based on *Metaph.* 1072^a27, where the form of the argument is slightly different.

24–28. οὐ πᾶν δὲ τὸ διανοητόν . . . ταύτῃ κινεῖ. On the contrast between practical and theoretical reason and their respective objects, and on the hierarchy of ends in living beings as indicated here, cf. Essay 4.

28–29. δὲ τιθέναι . . . ἀγαθόν. Whatever the agent takes to be good, or sees as good, can play the role of a motivating goal in our explanation. ἡδύ is used here in a narrow sense. Aristotle nowhere here commits himself to the claim that every practical goal is desired because it is in some way pleasant. The evidence points, rather, the other way: we should include the ἡδύ just because it is a variety of apparent good and not because the good itself is desired *qua* pleasant. (The opening of chapter 8 is more ambiguous—cf. *infra*.) *EN* 1113^a33 f. even more strongly states that pleasure is a source of deception, because although not a real good, it appears good, and hence men pursue it as a good. It is never fully clear whether Aristotle means to claim that everything that is pleasant (for X) is (for X) a φαινόμενον ἀγαθόν. But *EE* 1235^b26 implies that this is his view, in that work at least: διὸ καὶ τὸ ἡδὺ ὁρεκτὸν φαινόμενον γάρ τι ἀγαθόν. τοῖς μὲν γὰρ δοκεῖ, τοῖς δὲ φαίνεται, κἂν μὴ δοκῇ. Every pleasant thing appears good; the operative contrast is between what just appears good and what is also judged to be good.

On the good and the apparent good, cf. also *DA* 433^a27, *Metaph.* 1072^a27, *EN* 1113^a16, *Rhet.* 1369^a2–4, ^b18, and especially *Ph.* 195^a24–26 = *Metaph.* 1013^b26–28. In an interesting passage in the *Top.* (146^b36–147^a11), Aristotle criticizes the Platonists for not allowing, in their explanation of ends, for the fact that the apparently good or pleasant can play the same role as the really so. Wish and desire must, for them, be defined as having the really good or pleasant as their objects, since a form can be defined only with relation to other forms, and there cannot be a form whose total job is to display some variety of deceptiveness. See Owen's analysis of this passage.³

29–32. ὥστε δῆλον . . . ἔχει πέρας. On this contrast, cf. Essay 3. Farquharson's τὸ μὲν seems better (sc. τὸ αἰεὶ κινούμενον) than the MSS's τὰ μὲν.

32–35. τὸ δὲ αἰδίον καλόν . . . ἢ ὥστ' εἶναι πρὸς ἕτερον. Aristotle has contrasted the motion of animals with that of the

heavenly spheres, while indicating that these motions have in common that both are for the sake of some external object of desire. Now he goes on to contrast, parenthetically, both of these sorts of moving beings with the utterly unchanging first mover, whose activity is not relative to anything outside of itself. Its activity is self-sufficient and self-perpetuating to eternity and does not need to be stimulated by something external. The πρὸς ἕτερον of P and Γ (probably, again, from their common independent source) gives a satisfactory sense and fits well with the passage. The πρότερον of other codices will not do unemended. Michael and Leonicus write as though they read πρότερόν τι, and on the strength of this Jaeger emends the text. (The emendation is accepted by Forster and Louis.) But this makes a point that is not strictly relevant in the context.

What at first looks like a Platonic way of speaking (the good itself, which isn't now good, now not) need, then, refer only to the Aristotelian first mover—an eternal substance, but not a paradigmatic form of Good or Beautiful. In making the contrast between ἐμψυχα and the unmoved mover, Aristotle sharpens the contrast between animals and spheres by pointing to the superior and unchanging nature of the latter's object of desire.

34. θεϊότερον καὶ τιμιώτερον. These words are linked elsewhere, and contrasted with ἐπαινετόν: the τίμιον and the divine are above praise; the object of praise is praised because it stands in a certain relation to something else (*EN* 1101^b12 ff.; cf. *MM* 1183^b20 ff.). This supports the choice of the reading πρὸς ἕτερον.

701^a2–4. φανερόν δ' . . . ἐν τοῖς γινομένοις. Among animals, i.e., creatures subject to becoming, φορά is the last because the animal moves in consequence of qualitative changes associated with psychic activities. The heavenly bodies are eternal and not subject to qualitative change. φορά is their first, last, and only sort of motion. From the remarks about the limited character of animal motion it follows εὐλόγως that it involves qualitative change, and φορά is last because this qualitative change follows directly on the presentation of the object. τὸ ζῶον at 701^a4 thus neatly picks up γινομένοις at 701^a3. The same sense could be kept without emending, but then we would have

³ Owen, "Dialectic and Eristic," 118–19.

γίγνομαι being used in two different senses in the same brief sentence, which would be unfortunate. For further remarks about the emendation, and various alternative suggestions, cf. *HSCP*, pp. 144–45.

4–6. κινεῖται γὰρ . . . τὴν φαντασίαν. For this important sentence, and its implications for Aristotle's theory of soul, see Essay 3.

CHAPTER 7

In the first half of this chapter, Aristotle makes use of the soul-divisions set out in chapter 6 to offer examples of the teleological explanation of animal motion, using as a schema the so-called "practical syllogism." In the second half he turns his attention to the animal's physiology, explaining that animals are naturally constructed so that a small change in a central part results in varied and complex changes in the rest of the body. Included is some discussion of how qualitative changes in the body are correlated with the cognitive activities mentioned in chapter 6.

The first half of this chapter is discussed at length in Essay 4. Much of the second half is analyzed in Essay 3; for all remarks concerning φαντασία, cf. Essay 5.

701^a7. πῶς δὲ νοῶν. On the meaning of this sentence, cf. Essay 4, and, for the generic sense of *noein*, the note on 700^b17. Here Aristotle seems to be thinking of the function of the cognitive faculties in initially presenting the object of desire: the object may be present to one's mind, but nothing follows about action unless desire is also active. It develops below that cognition has a second function, specifying here-and-now possibility (cf. the examples of minor premises, especially 701^a32–33, and 701^a5–6). These two stages are not always distinct; for non-human animals we will rarely be able to distinguish them. But the *MA*'s abstraction from the complexities peculiar to human action makes this portion of the account less clear than one might have wished.

7–8. ὅτε μὲν πράττει . . . ὅτε δ' οὐ κινεῖται. The use of both πράττει and κινεῖται here may be a reflection of Aristotle's denial of *πρᾶξις* to non-human animals in *EN* 1139^a20; so πράττει would refer to humans alone, κινεῖται to animals generally. But *πρᾶξις* is sometimes ascribed to animals other than man elsewhere in Aristotle. Two examples are *PA* 646^b15: πολυμόρφων δὲ τῶν πράξεων καὶ τῶν κινήσεων ὑπαρχουσῶν τοῖς ζῴοις, and

HA 487^a11–12: αἱ διαφοραὶ τῶν ζώων εἰσι κατὰ τε τοὺς βίους καὶ τὰς πράξεις καὶ τὰ ἥθη. The first might be compatible with a restriction of πράξεις to one group of animals, but the second would be difficult to read this way. If we do not understand this distinction here to be between the activities of men and those of other animals, we might see πράξεις as a broad term, potentially covering further steps of calculation as well as the eventual bodily motion (cf. the cloak example and Essay 4 on this), and κίνησις as the actual bodily movement of the whole creature.

8. εἶκοι παραπλησίως συμβαίνειν. On the practical-theoretical parallel, cf. Essay 4.

9. περὶ τῶν ἀκίνητων. For the ἀκίνητα as objects of θεωρία, cf. *Metaph.* 1026^a15, *DC* 305^a25, *EE* 1222^b23, *Ph.* 198^a17, and especially *EN* 1143^b1–3: ὁ μὲν (sc. νοῦς) κατὰ τὰς ἀποδείξεις τῶν ἀκίνητων ὄρων καὶ πρώτων, ὁ δ' ἐν ταῖς πρακτικαῖς τοῦ ἐσχάτου καὶ ἐνδεχομένου καὶ τῆς ἐτέρας προτάσεως.

10–11. ὅταν . . . συνέθηκεν. There is a serious error implicit in this account. In the practical case, if the agent actually has certain beliefs and desires, he must behave in a certain way. The premises are his own subjective states (cf. Essay 4). In the theoretical case, the premises themselves *objectively* imply the conclusion; but it is not true that a man who thinks about each of the two premises is *ipso facto* bound to draw the conclusion. For that, something further is required: that he put the two premises together. This point is made in the account of error in *APr* II.21 (67^a33 ff.) and is taken up in the account of the practical and theoretical syllogisms in *EN* VII.3 with the phrase ὅταν δὲ μία γένηται ἐξ αὐτῶν. The *MA* should have included a similar qualification for νοήση, Aristotle might have written συνθεωρήση (cf. *APr* 67^a37).

11–13. ἐνταῦθα δ' ἐκ τῶν δύο προτάσεων τὸ συμπέρασμα γίνεται ἡ πράξις. “The conclusion that results from the two premises is the action.” So the sentence is translated by Farquharson (“the two premises result in a conclusion which is an action”), Louis (“la conclusion des deux propositions est l'action accomplie”), and Torraca (“dalle due premesse s'inferisce come conclusione l'azione”). Forster's “the conclusion drawn from the two premises becomes the action” seems to violate the emphasis of

the word order; nor does it accord with 701^a22–23 (“it is obvious that the conclusion is the action”), which is supposed to offer a recapitulation of this passage. In a passage whose purpose is to compare and contrast the forms of theoretical and practical reasoning, it would be odd to find, instead of a contrast between two conclusions, a contrast between a conclusion on the one hand and the result of a conclusion on the other. We would not know if there was any valid contrast if we were told nothing about the nature of the practical conclusion itself.

13–15. οἷον ὅταν νοήση . . . εὐθὺς ἡρεμεῖ. For the problems posed by this pair of syllogisms, cf. Essay 4. βαδίζειν should be understood to mean “take walks” generally (for the sake of health), not “go somewhere (unspecified).” Cf. Leonicus' *deambulare*, and *EN* 1129^a16–17, where health is connected with βαδίζειν, though to make a different point. This interpretation is supported by the fact that the negative and not the positive side has a νῦν: all men should take walks, but nobody should go walking, for example, in bad weather. It has been suggested by Kenny¹ that the question that opens this chapter points to a contrast between syllogisms with positive and those with negative conclusions; this he uses as evidence that the conclusion need not always be an action. But Aristotle seems to be understanding πράξεις broadly, to mean whatever one does as a result of one's deliberation about the goal. His ἡρεμεῖ must mean “he remains at rest,” for ἡρεμίζει or some other word would be used for “he comes to a stop.” And yet he continues, καὶ ταῦτα ἄμφω πράττει. Apparently Aristotle means us to understand that once the state of rest is chosen as a result of the agent's deliberation (although he may have been at rest before) it is then an action, and, *qua* action, follows directly from the two premises.

16. ἂν μὴ τι κωλύῃ ἢ ἀναγκάξῃ. These may possibly serve as alternatives for the positive and negative cases: “unless he is somehow prevented from walking (in the first case) or constrained to walk (in the second).” Cf. *EN* 1147^a3, *Metaph.* 1048^a16–20, 1049^a5–9.

¹ Kenny, “The practical syllogism,” 176–77.

16–17. ποιητέον μοι ἀγαθόν . . . ποιῶ οἰκίαν εὐθύς. This, as Hardie observes,² is the only example of practical inference in all of Aristotle without a purely factual premise (or at least a factual component of the minor premise). We need to supply some further premise or component to explain why housebuilding is chosen over other alternatives. E.g., “I am a trained builder,” i.e., “A house is the good thing that I am best equipped to make,” or (Hardie’s suggestion) “Here I am in a position where housebuilding can start”—which would still not fully explain the choice of housebuilding over other alternatives. This is the sort of immediate reflection on one’s actual situation that, Aristotle argues in the subsequent paragraph, is often passed over by the agent, and so, presumably, need not always be included in our account—although all Aristotle’s examples include at least one element of the (possibly compound) minor premise.

19–20. ἰμάτιον ποιητέον . . . πρᾶξις ἐστίν. *ab*₁ have ἰμάτιον ποιῶ as the conclusion of the syllogism. But this makes the following sentence difficult to interpret, and is probably an emendation to bring this example into conformity with the others. What seems to have happened here is this: Aristotle wants, with this example, to give an illustration of how the action that is the conclusion can include further deliberative steps until we get to what is in our power: the activity of cloak-making (the πρᾶξις that is the conclusion) involves procuring the materials. (Similarly, when he said in the house example, “At once he makes a house,” he did not commit himself to saying the man breaks the ground immediately, without going out to look for helpers, supplies, etc.) Because he is not going to stop with “And he makes a cloak,” but to continue by offering more detail about the process, he uses the conclusion ἰμάτιον ποιητέον as an intermediate step, as, above, he had used ἰματίου δέομαι—but then goes on to claim that the conclusion that counts as such is the action—i.e., there may or may not be a verbalized conclusion (in this case there probably is), but

what is important is that the cloak-making actually begins, and this is how that happens. For further remarks, see Essay 4.

23. αἱ δὲ προτάσεις αἱ ποιητικαί. For ποιητικός as equivalent to πρακτικός cf. *EN* 1147^a28: ἐν δὲ ταῖς ποιητικαῖς πράττειν εὐθύς, and *EE* 1227^b30: οὕτω καὶ ταῖς ποιητικαῖς τὸ τέλος ἀρχὴ καὶ ὑπόθεσις.

24–25. διὰ τε τοῦ ἀγαθοῦ καὶ διὰ τοῦ δυνατοῦ. For this important distinction, cf. Essay 4.

26. ὥσπερ τῶν ἐρωτῶντων ἐνιοι. ἐρωτᾶν usually designates the method of dialectical reasoning, as opposed to that of demonstrative reasoning, or λῆψις: whereas in the latter we assume one of two contraries, in the former we ask which of the two the opponent admits, and argue accordingly (*APr* 24^a22 ff., and cf. also *Top.* VIII.1–3). But the possibility of passing over the obvious is admitted by Aristotle, in some cases, for demonstrative reasoning as well. *APo* 76^b16 ff: ἐνίας μέντοι ἐπιστήμας οὐδὲν κωλύει ἐνια τούτων παρορᾶν, οἷον τὸ γένος μὴ ὑποτίθεσθαι εἶναι, ἂν ᾗ φανερόν ὅτι ἐστίν . . . καὶ τὰ πάθη μὴ λαμβάνειν τί σημαίνει, ἂν ᾗ δῆλον: ὥσπερ οὐδὲ τὰ κοινὰ οὐ λαμβάνει τί σημαίνει τὸ ἴσα ἀπὸ ἴσων ἀφελεῖν, ὅτι γινώσκον.

28–33. διὸ καὶ ὅσα μὴ λογισάμενοι . . . εὐθύς πίνει. The statement that the activity of desire is swift and the agent does not always pause for the minor premise is not obviously an appropriate introduction to the following “drink” example, where all the parts are fully explicit. The sequence of the argument seems to be as follows: In all sorts of thinking, we do not pause for the obvious. This can be illustrated by the case of a rational major premise converted into action swiftly because there is no pause for the minor. But, more generally, *whatever* we do without calculating (καὶ ὅσα indicates a new point is being made) we do quickly. For desire sometimes impels us to action just on the strength of the antecedent apprehending, and we act without fully considering the particular case. A related case will be that in which a complete syllogism of appetite goes through quickly because no calculating is involved (though all parts are explicit): the drink case. The transition from the *ὅταν* sentence

² Hardie, *AET*, 246.

to the example is still troublesome, but less so, I think, if both are seen as different illustrations of a general observation made in the *διό* sentence (of which the “walk” case above is still another illustration).

The medieval commentators took this “drink” example to be an example of *akrasia*. But the general observation that desire can sometimes lead straight to action without explicit reflection is applied most obviously in the rational “walk” case, and we find no illustration involving any sort of conflict. We might, however, use this passage in constructing an explanation for a case where there are two syllogisms, one with a bouletic, one with an epithumetic, major premise, and which are somehow in conflict. The *ἐπιθυμία* syllogism might be acted upon rather than the other if, as in the drink case, it did not require calculation and had a quickly graspable minor, so that it would be complete before the inhibitory rational syllogism could be properly finished (as, for example, if the minor premise of the latter required some calculation: “Don’t drink to excess; one more drink would, given the number I’ve already had, be excessive,” etc.). Aristotle’s account of *akrasia* in the *Ethics* does not seem to rely on such time-factors, but an explanation of this sort might help show why a minor premise of the syllogism of the good is not activated. So the *MA*, while not interested in presenting an account of *akrasia*, has some implications for our understanding of the account Aristotle does present.

29–30. *ὅταν ἐνεργήσῃ γὰρ . . . τῷ νῷ*. “When one is actually using *αἰσθησις* or . . .” Cf. *HA* 503^b23 (*ἐνεργεῖν τῷ πνεύματι* = go on breathing), *MM* 1201^b13 (*ἐνεργεῖν τῇ ἐπιστήμῃ* = be actually using one’s knowledge), *Mem.* 452^b24.³

31–32. *ἡ τῆς ὁρέξεως . . . ἐνέργεια*. “The active desire,” “the activity of desire.” Cf., among many others, *Pol.* 1328^b38 (*ἐνέργεια ἀρετῆς*), *GA* 740^b28 (*ἡ ἐνέργεια τῆς τέχνης*), *DA* 425^b26, 428^b13. Forster mistakenly writes, “the carrying-out of his desire.”

701^b1. *διὰ ὅτι [ὁρᾷν ἢ] βούλησιν*. The use of *ὁρεξις* as a species is unparalleled, and inexplicable here, especially in view of

τῶν δ’ ὁρεγομένων πράττειν above. It is better to bracket it and see the *τὰ μὲν . . . τὰ δέ* as contrasting the actions involving rational wanting with those involving the two irrational species. Cf. *HSCP*, 146.

1. *τὰ μὲν ποιοῦσι, τὰ δὲ πράττουσι*. The usual Aristotelian distinction is that in *πράττειν* the end is the activity itself, in *ποιεῖν* something else besides the activity (*EN* 1140^b6–7, cf. 1140^a2; *Pol.* 1254^a5). The examples have included cases of both.

2. *ὥσπερ δὲ τὰ αὐτόματα κινεῖται*. The general point of these two examples is this: Just as, in the case of automatic puppets, a small and simple initial movement can, because of the arrangement of the mechanism, set off a complex sequence of different motions of the puppet or puppets, and just as, in the case of the little cart with wheels of unequal size, a simple push forward is, by the nature of the cart itself, translated into motion in a circle, so in the case of animals a small and simple original movement can result in many and varied motions of the limbs without any further external stimulus, just because of the nature of the mechanism itself. (In the case of animals, however, the sequence is from alteration to locomotion, not from one sort of locomotion to another.) (Cf. Furley,⁴ and Farquharson and Buridan *ad loc.*, for similar accounts of the passage.) The difference between the two examples seems to be primarily one of emphasis: the puppet example underlines the generation of a whole series of motions from a single initial motion, the cart example the change in character or a motion because of the nature of the functioning mechanism. (Both Buridan and Burley substitute for the puppets the example of a weighted clock. Albertus claims that both examples are to be understood only with reference to the “involuntary” motions of chapter 11—a claim for which there is no evidence in the text. For an extensive historical discussion of the examples, and a defence of textual suggestions, cf. *HSCP*, pp. 146–52.⁵

⁴ Furley, *Two Studies*, 216.

⁵ The primary ancient sources for the puppets are *Pl. Rep.* 514 b, *Laws* 644 b ff.; *Ar. Metaph.* 983^a12 (and *Alex. Aphr. ad loc.*), *GA* 734^b11 ff., 741^b9 ff. (and *Ps.-Philoponus ad loc.*); *De Mundo* 398^b13 ff.; *Galen, De Usu*, 48, 262; and especially Heron Alexandrinus, *Automatopoietica*.

³ Cooper, *Reason*, 52, n. 56, 53, n. 68.

5-6. ὁ γὰρ . . . ἐν τοῖς κυλίνδροις. A very obscure reference. Aristotle evidently thought this brief mention of κύλινδροι sufficient to suggest the right picture; but no obvious reading suggests itself to us. This is, in fact the only use of κύλινδρος in the *corpus*. Michael speaks of children's toy wagons with cylindrical wheels, *χαριέντα ἰδεῖν διὰ τὸ περιτιθέμενον αὐτοῖς κάλλος ὑπὸ τῶν ζωγράφων* (118, 30-33). This is fanciful, and does not provide a helpful illustration of the principle in question. Torraca's idea is that the κύλινδροι are just the axles of the very carts being discussed: the smaller wheel becomes a center for their circular motion. But *καθάπερ* indicates Aristotle is using a parallel—"just as happens in the case of κύλινδροι"—and it would be hard to read it as providing further elaboration of the same picture. St. Hilaire, and Louis following him, speak of conical rollers used for crushing cement, but the cone is usually kept distinct from the cylinder (cf. Democritus, *DK B 155; Probl.* 913^b38), and it is hard to see how so brief a reference could be expected to suggest something so removed from ordinary experience.

What is required is a roller with a smaller end and a larger end, which will, when pushed ahead, roll in a circular course around the smaller. (The word by Aristotle's time certainly need not imply that both ends have the same cross-section.) Galen⁶ refers briefly to a children's toy called by this name, whose shape he contrasts with that of columns: *καλῶ δὲ κύλινδρον οὐχ ὅτι παίζουσιν αἱ παῖδες, ἀλλὰ τὸ τοῖς κίουσιν ὑπάρχον σχῆμα*. The word in ordinary usage must, without further glossing, have been likely to suggest these toys, or no explanation would be needed. Perhaps the toys were little rollers of the shape suggested, and the subject of Aristotle's reference here. He might even have given a demonstration as he spoke, rolling it straight forward and showing how it rolled in a circle. Even if this is not the parallel required, the passage's cryptic style gives evidence of a lecture format, and some demonstration was probably offered.

⁶ Galen, in *Med. Gr.* (Kühn) 18 (1). 462.

7-8. ἔχει γὰρ . . . τὴν τῶν ὁσῶν. Aristotle's use of *ὄργανον* stays close to ordinary usage and hence can cover any part that fulfills some function. Generally each function has a separate *ὄργανον*: the hand is not one *ὄργανον*, but many, because of the multiplicity of its functions (e.g., *PA* 687^a19-21); and *GA* 765^b36 states that there is an *ὄργανον* answering to every capacity (cf. also *PA* 683^a19, ^b7, and *GA* 732^b27). Thus Forster's translation, "Animals have similar parts in their organs, namely, the growth of sinews and bones," is misleading: the sinews and bones are considered here as "tools" whose functions are analogous to those of corresponding parts of the machine.

νεῦρον is Aristotle's general term for sinew or tendon, *τένων* (Galen's general term) being a particular *νεῦρον* (*HA* 515^b9). All bones that are adjacent to each other are bound together by *νεῦρα* (*HA* 515^b12). The *ἀρχή* of the network of *νεῦρα* is at the heart, but the network, unlike that of the blood vessels, is not continuous (*HA* 515^a32-34). All blooded animals have sinews, but those without joints—the handleless and footless—have them only indistinctly (515^b23-25). So the claim here does not hold for all animals, but Aristotle would probably want to claim there is some analogous part in the case of lower animals as well.

Bones do form a continuous network (*HA* 516^a8); as a result, nature can use them both as one and as two, divided at the joint (*PA* 654^a32 ff.). As for the periphrasis with *φύσις*, cf. Bonitz, *Index*, 838^a8 ff., and especially *HA* 515^a33, 511^b20; *Resp.* 476^a24-25.

9-10. ὦν λυομένων καὶ ἀνιεμένων κινούνται. Farquharson's emendation to ὦν συστέλλομένων καὶ ἀνιεμένων κινούνται is unnecessary. Aristotle has just described the beginning of motion in terms of releasing only—though of course a contracting could begin it as well. There is no reason to think he must include both releasing and tightening here. Further, the word *συστέλλομένων* would not fit the puppet strings, which are wound up or tightened, but do not contract.

10-13. ἐν μὲν οὖν . . . ἐκινεῖτο. οἱ ἐντὸς πρόχοι is plural

because the carts have just been spoken of in the plural, not because each cart has four wheels. There is no reason for having qualitative change in the machines; after all, if the inner wheel of the cart were capable of expanding and contracting, it would still move in a circle in a way similar to its actual motion. There is no need to translate ἐπεὶ concessively, as do Farquharson and Forster. (Bonitz's examples of the concessive ἐπεὶ—*HA* 541^a32 and 587^b30—are not convincing, though *Metaph.* 1030^a34, which he does not cite, is better.) The cart is not made to have expanding wheels, since this would not be a noticeable advantage in terms of function.

13–16. ἐν δὲ τῷ ζῷ . . . ἀλλοιούμενων. Cf. *infra*, 701^b23–24: ἀλλοιούμενων δ' ἐν τῷ σώματι τὰ μὲν μείζω τὰ δ' ἐλάττω γίνεται, and 703^b11–13: ἀνάγκη ἀλλοιοῦσθαι τὰ ζῶα φυσικὴν ἀλλοίωσιν, ἀλλοιούμενων δὲ τῶν μορίων τὰ μὲν αὐξεσθαι τὰ δὲ φθίνειν. Two steps are indicated: the heating or chilling (the ἀλλοίωσις), and the ensuing expansion or contraction. The account of the cart at lines 10–13 above omits the first step, but we may understand it to mean, "In carts there is no ἀλλοίωσις, since if the inner wheels were to expand and contract (as the result of an ἀλλοίωσις—i.e., a heating or chilling) they would still move in a circle." Similarly, *Ph.* IV.7, 214^a32 ff. (ἐνδέχεται . . . αὐξάνεσθαι οὐ μόνον εἰσιόντος τινὸς ἀλλὰ καὶ ἀλλοιώσει, οἷον εἰ ἐξ ὕδατος γίγνεται ἀήρ) need not be read as claiming that expansion and contraction are a kind of ἀλλοίωσις, but only as observing that they can follow a qualitative change: when water is heated, it then expands and becomes vapor. *Ph.* 190^b5 and VII.3 distinguish μετασχημάτισις from ἀλλοίωσις. In chapter 10, the *pneuma* will be said both to expand and contract and to undergo no qualitative change. The expansion is not αὐξησης in its strict sense, since no new matter is added (cf. *GC* I.5). *Ph.* IV.7 introduces this weak sense of αὐξάνεσθαι (cf. *supra*).

For examples of expansion and contraction produced by heating and chilling, cf. the account of the leap of the heart from fear at *Resp.* 479^b19 ff. and 480^a13 ff.; and also *GA* 783^a37–b2, *Probl.* 888^a12 ff., and *PA* 648^b18 ff.

16. καὶ ἀλλοιούμενων. This does not indicate that a further

change takes place in addition to the heating and chilling; it is epexegetic of what has preceded.

16–22. ἀλλοιοῦσι δὲ . . . νοήσαντες μόνον. For an analysis of this important passage, cf. Essay 3.

20. τὸ τοῦ [θερμοῦ ἢ ψυχροῦ ἢ] ἡδέος ἢ φοβεροῦ. The thought of something pleasant or painful is of necessity accompanied by heating or chilling (cf. chapter 8). But it is hard to make sense of the inclusion of "the thought of the hot or cold" in this context. Surely thinking of something hot will inspire desire or revulsion depending just on what hot thing it is that is conceived. Aristotle nowhere suggests that the hot and cold have, in themselves, any particular motivating power as objects of thought. Cf. *HSCP*, p. 152.

24–27. ὅτι δὲ . . . μετάστασις. A general observation, one particular case of which—the alteration in the region of the heart—will be discussed below. ἀρχή here seems to mean origin of motion (cf. the first sense in *Metaph.* V.1). ἀκαριαῖος is etymologically a synonym of ἄτομος,⁷ but is used by Aristotle just to mean "extremely small" (cf. *Mem.* 451^b26 for a possibly similar use of ἄτομος). It occurs in a similar context in *HA* 590^a1–4: μικροῦ γὰρ μορίου πηρωθέντος εἰς τὸ θῆλυ μεταβάλλει τὸ ζῶον, ὥστε δῆλον ὅτι καὶ ἐν τῇ ἐξ ἀρχῆς συστάσει ἀκαριαῖον τινὸς μεταβάλλοντος τῷ μεγέθει, ἐὰν ἢ ἀρχοειδές, γίνεται τὸ μὲν θῆλυ τὸ δὲ ἄρρεν. *GA* 716^b3 ff. and 788^a11 ff. make similar observations. Cf. also *DC* I.5, 271^b12 on the great difficulties that can result from making a small mistake in the ἀρχή of the inquiry.

28–32. ἔτι δὲ . . . ἐναντίοις. The ἀρχή in question is now specified as the region about the heart. The ἔτι δὲ indicates that, formally, the rudder example and this heart example are both offered in illustration of the general truth above. The central importance of the heart for Aristotle is apparent in all the biological works. It is the first organ to be formed, the last to perish, the seat of the vital heat. It plays a central role in sensation, and also, we learn now, in motion. One argument for locating the ἀρχή of motion there will be that it is the seat of the αἰσθητικόν (702^b20–25).

⁷ Chantraine, *Dictionnaire étymologique*, s.v.

Aristotle does not claim here that the large-scale changes we observe *must* be explained with reference to changes too small to be perceived, or that the observed facts about the heart do not serve to make the sequence comprehensible. His theory here is not, then, of the type elaborated by Anaxagoras, Empedocles, and the Atomists. He seeks to emphasize the importance of the heart by saying that *any* change in this region, even if (εἰ καὶ is clearly preferable) it is in a part too small for us to perceive, will have large-scale repercussions.

The repetition of ἐν does not seem too odd for the rather unpolished style of this treatise; but it is possible that ἐν ταύτῃ is a gloss.

31–32. ἐνδύμασι . . . ἐναντίοις. Michael's paraphrase does not include καὶ τοῖς τοῦτων ἐναντίοις (115, 22). Farquharson suggests the phrase is a gloss. But we can make sense of it if we refer it only to the last two of the four manifestations listed. The "opposites" of these manifestations of fear, associated with a chilling in the heart region (cf. *infra* p. 354 on chapter 8, 702^a2–5), would be manifestations of fear's opposite: anger (*Probl.* 889^a15–16), or θάπρος (*EN* 1107^a33, 1115^a6–7, 1117^a29; *Rhet.* 1383^a16–17). On passions associated with heating, cf. *DA* 403^a31–b1, *PA* 650^b35, *Probl.* IV. On φρίκαι and τρόμοι, cf. also *Somm.* 457^b15–16. *Meteor.* 366^b15, 368^b23; on blushing, *Probl.* 903^a2–4.

CHAPTER 8

Aristotle continues his discussion of the physiological mechanism, with particular emphasis on the relationship between psychological and physiological processes. Illustrations are offered for the importance of heating and chilling, and a general account is given of the suitability of the bodily parts for qualitative change. The first section of the chapter concludes with a summary of the sequence of changes preceding motion which is misleading on crucial points. This section of the chapter, and this sentence in particular, are discussed in Essay 3 (cf. also Essay 5 for its implications for the account of *phantasia*).

The chapter's second half returns to the subject of the bodily ἀρχή, introduced in chapter 7, and begins to show why it is important that there be one single central ἀρχή in the body, whose proper functioning will be a necessary condition for the goal-directed activities described. This is done in connection with a reexamination of the question of joints, which had been raised in chapters 1 and 2. On the language of soul "location", and several other points in this section, cf. Essay 3.

701^b33–34. Ἀρχὴ μὲν οὖν . . . φευκτόν. The back-reference is to chapter 6, 700^b15–17, 24–25. Here διωκτόν καὶ φευκτόν replace the simple ὁρεκτόν of 700^b24, perhaps in order to make it clear that in cases of motion away from an object, as well as motion towards it, the object is to be regarded as ἀρχή.

34–702^a2. ἐξ ἀνάγκης . . . συμβαῖνον)). Cf. Essay 3 for the first sentence. The structure of this argument seems to be: the thought, etc., of the object of pursuit and avoidance is of necessity accompanied by heating and chilling. For we know (for example, from our observation of the passions) that the (contemplation of the) pleasant and painful is accompanied almost always by heating or chilling, and the pleasant is an object of pursuit, the painful an object of avoidance. Whether we take this as an attempted proof or only as offering relevant evidence will depend on our reading of lines 35–36: does it claim just that

all pleasure is pursued, or also that whatever is pursued is the pleasant? If the first, Aristotle will just be saying that one kind of evidence for our more general point is this observation about the pleasant, which can easily be made in the case of the passions. The suggestion would be that to establish the physiological conditions for the contemplation of objects of pursuit other than the pleasant might prove more difficult—cf. the interpretation of 701^b16–22 in Essay 3. If the second, the claim would be that to replace *διωκτόν* and *φευκτόν* with *ἡδύ* and *λυπηρόν*, which are identical with them, makes the truth of our statement more perspicuous; and one kind of evidence for the general truth can be drawn from the passions. The second leaves the argument looking somewhat better, but the first is more consistent with Aristotle's use of *ἡδύ* in chapter 6, where he seems deliberately to avoid the claim that every object of desire is such because it is in some sense pleasant (and cf. the evidence cited there for a similar view in other works). It is easier to read lines 35–36 as a predication, rather than a statement of identity. We must conclude that Aristotle is offering not a conclusive argument for his thesis, but a persuasive example of its operation. On the transposition (following a suggestion of Moraux¹) cf. *HSCP*, pp. 153–54.

Aristotle's excessive reliance on the simple mechanism of heating and chilling to explain complex phenomena is evident throughout this chapter. Cf. *PA* 646^a16–18: *ὑγρόν καὶ ξηρόν καὶ θερμόν καὶ ψυχρόν ὅλη τῶν συνθέτων σωμάτων ἐστίν. αἱ δ' ἄλλαι διαφοραὶ ταύταις ἀκολουθοῦσιν*. Also *GC* II.2, *Meteor* IV.1, *GA* 740^b31 ff., and *infra* on 702^a9–10. The author of "On Ancient Medicine" is critical of those who explain medical phenomena with reference to such principles (I.2–3: *ὑπόθεσιν αὐτοὶ αὐτοῖς ὑποτιθέμενοι τῷ λόγῳ θερμόν ἢ ψυχρόν ἢ ὑγρόν ἢ ξηρόν ἢ ἄλλο τι ὃ ἂν θέλωσιν*).² But his criticism is directed principally at those who prescribe treatment in vague a priori terms, advising the administration of "the hot" rather than "hot X." Aristotle's statements here, while no doubt indebted to medical

doctrines, are not open to just this criticism, since in talking of the hot and the cold he always speaks of particular bodily parts that become hot or cold in certain circumstances.

3–5. *θάραξ γὰρ . . . τὸ σῶμα*. *DA* 403^a17 includes *θάραξ* and *φόβος* among the passions that are necessarily accompanied by bodily changes. On *φόβος* cf. *PA* 650^b27 ff., 679^a25–26, 692^a23–24; *Resp.* 479^b19 ff.; *Probl.* 888^a12 ff., 902^b37–39. *θάραξ*, as fear's opposite (*EN* 1107^a33, 1115^a6–7, 1117^a29; *Rhet.* 1383^a16–17), will be analyzed in corresponding fashion, in terms of heating. *ἀφροδισιασμός*, which elsewhere means "sexual intercourse" (e.g., *GA* 725^b17–18; Hippocr. *Aphorismoi* 6. 30), seems here to mean "sexual arousal."

5–7. *μνημαὶ καὶ ἐλπίδες . . . αἰτίαι τῶν αὐτῶν εἰσίν*. Only Leonicus ("tamquam simulacris utentes"), William ("quasi ydolis utentes"), and, among modern translators, Louis ("qui utilisent comme images") offer a faithful translation. The others feel constrained to turn *τοῖς τοιοῦτοις* into a dependent genitive: Farquharson, "So memories and anticipations, using as it were the reflected images of these pleasures and pains;" Forster, "Recollections, too, and anticipations, employing, as it were, the images of such feelings;" Torraca, "I ricordi e le anticipazioni, presentandoci, per così dire, le immagini di tali sentimenti." In fact, the sentence seems to point to a promising revision of Aristotle's theory of memory. In the *Mem.*, the object of memory is a representative image, which is regarded as a replica of something in the world (cf. *Mem.* 450^b20 ff., 451^a15). Here it is indicated that memory and imagination about the future have as their objects not images of the actual things, but the things themselves—for *τοῖς τοιοῦτοις* surely refers to the experiences named in the preceding sentence. Imagination is not, then, the awareness of a mental picture-copy of a pleasant or fearful state of affairs, but a special kind of awareness of the state of affairs itself: an awareness of it *as* something past or future. This explains better than the *Mem.* account why imagining is able to cause the same reaction as the thing itself. When we look at a painting of a fearful scene, we are as likely to feel pleasure as fear. In keeping with the development of his

¹ Moraux, *AntCl*, 366.

² In Littré, I. Cf. also the Loeb edition of W. H. S. Jones (1962).

theory of *phantasia* in the *MA* and in *DA* III.9-11, Aristotle seems here also to be reconstructing his account of memory and anticipatory imagining to do away with decaying-sense images. See the further remarks on this in Essay 5, pp. 249-55.

On ἐλπίς, cf. *Mem.* 449^b27-28: it stands to things future as does memory to things past and perception to things present. "Anticipation" is hence a better translation (Forster, Farquharson, Torraca) than "hope" (Louis), which implies some activity of desire. The point that memory and anticipation are reasons for the changes sometimes more, sometimes less, probably is a remark about differing degrees of immediacy and vividness of the thoughts in question, and may also concern the present activity and bodily state of the subject at the time of his remembering or anticipating.

7-8. ὥστ' εὐλόγως ἤδη δημιουργεῖται. For the metaphor of nature as craftsman, cf. *GA* 731^a24, 743^b2-3; *PA* 645^a7 ff.; *IA* 711^a18. Aristotle's use of this metaphor does not imply that he believes in a universal teleology of nature (cf. discussion in Essay 1). For ἤδη in the meaning "hence" or "consequently", cf. Bonitz, *Index*, 314^a10 ff., and especially *Metaph.* 1022^b19 and *EN* 1177^b6, which seem to be his most convincing examples.

8-9. τὰ ἐντὸς . . . ὁργανικῶν μορίων. τὰ ἐντὸς are the internal areas in which alteration takes place, especially the region around the heart. The ὁργανικά μέρη are non-homoiomeric parts, particularly, here, the limbs. (For the general equivalence of ὁργανικά and ἀνομοιομέρη, cf. *PA* 646^b25 ff., 647^a3; *GA* 734^b27-28; examples at *PA* 650^b20 ff. include face, hand, and foot. *IA* 705^b22 speaks of the use of organic parts—e.g., feet, wings—for locomotion; and cf. *EN* 1110^a16, *DA* 432^b25, 433^b21 for similar usages.) A contrast similar to the one drawn in this passage is found at *PA* 647^a14-30: the seat of sensation is in the homoiomerous parts, whereas πράξεις come to be through the agency of the non-homoiomeric. Cf. below, 702^a16 ff., where the distinction between the preparation of πᾶσθ by ὄρεξις and the preparation of organic parts by πᾶσθ would presumably correspond to the distinction here between the change in the "internal" regions and those in the limbs.

The ἀρχαί of the limbs are, presumably, the joints (cf. 702^a22, *DA* 433^b21), or the hypothetical points in them; in the latter case the force of saying τὰ περὶ τὰς ἀρχάς would be to emphasize that the change must be in a part of some size. *GA* 741^b12 ff. indicates that these changes occur only in homoiomerous parts; so we might understand τὰ περὶ τὰς ἀρχάς—as opposed to the limbs themselves—to be homoiomerous.

9-10. μεταβάλλοντα . . . ἐξ ἀλλήλων. Alterations in internal regions and in the areas around the joints are hardenings and softenings, settings and loosening of the parts under the influence of heat and cold. Setting due to cold will be accompanied by πύκνωσις and contraction, loosening due to heat by μάνωσις and expansion. This theory of the activity of the primary contraries (the warm and the cold being the active pair, the fluid and the solid the passive) is given its fullest exposition in *GC* II.2 and *Meteor.* IV. Cf. especially *GC* 329^b26 ff., *Meteor.* 378^b15 ff., and, on the soft and the hard, 382^a8 ff. Setting or hardening can be accomplished by the warm (parching of earthy bodies) or the cold (hardening of fluid bodies); but parching is not mentioned in concrete biological examples, so here it is likely that the setting is setting of the fluid due to cold. For concrete applications of these theories to physiological problems, cf. *PA* 653^b3-8 (certain diseases can be traced to excessive fluidity or solidity of the brain), *GA* 762^a29-31, 738^a13-18 (the cold water causes the shells of testaceans to congeal); especially *GA* 741^b12-15, where the development of the fetus is explained in terms of such alterations.

10-15. τούτων δὲ . . . πάσχει. Once the initial bodily alterations are set up, there will be other alterations that follow automatically from these because of the δυνάμεις of the bodily parts. With οἷαν πολλαχοῦ εἰρήκαμεν Aristotle refers in particular to the lengthy treatment of ποιεῖν and πάσχειν in *GC* I.7-9, but there are other contexts where similar remarks are made. Things disposed to be active and passive are contraries in the same genus, and when they are juxtaposed, assuming all the conditions for fulfilling their potential have been met, straightway the change goes on (cf. *Ph.* 251^b3, 255^a34; *Long.* 465^b15 ff.; *GA*

740^b1–24; and for similar remarks in a different context, cf. *Metaph.* 1048^a5 ff.).

15–17. διὰ τοῦτο . . . ἔτερον. Having said in his discussion of the practical syllogism that action follows as the conclusion of the two premises, Aristotle has now shown us in virtue of what arrangement of the bodily parts this happens. The thought and the movement are virtually simultaneous because the initial alteration that accompanies the thought leads, *via* the natural interaction of active and passive, to motion of the limbs. νοεῖ ὅτι πορευτέον need not refer to an explicit propositional conclusion to the syllogism; it is more likely to designate the major premise (i.e., παντὶ βαδιστέον ἀνθρώπῳ). The minor premise does not detain the agent, and the bodily parts interact rapidly, so there is virtually no gap between the thought of the major premise and the motion.

17–19. τὰ μὲν γὰρ ὁργανικὰ μέρη . . . δι' αἰσθήσεως. On the importance of this sentence for Aristotle's account of soul and body in the treatise, cf. Essay 3. For the role of φαντασία indicated here, cf. Essay 5.

20–21. ἅμα δὲ . . . τὴν φύσιν. Both *Metaph.* V.15 and *Ph.* III.1 (200^b28–31) include the ποιητικόν and παθητικόν as main categories of τὸ πρὸς τι, things which are called what they are relatively to something else (cf. *Cat.* 7). Examples given at *Metaph.* 1020^b29–30 are τὸ θερμαντικόν πρὸς τὸ θερμαντόν, τὸ τμητικόν πρὸς τὸ τμητόν. The second τὸ (διὰ τὸ τὸ ποιητικόν) was added by Bonitz, and is now confirmed by the readings of *b*₂.

21. At the end of chapter 7, Aristotle spoke of the heart's role as ἀρχή for local motion (i.e., the region where the qualitative changes occur that lead directly to motion of the limbs). But his account of bodily mechanics has not shown that there *need* be a single area on which all the body's diverse motions depend, though the puppet analogy was used to persuade us that this might be possible. Chapter 1 established just that there must be some internal ἀρχή of movement for the animal, "supporting itself against which it will move, both all at once as a whole, and part by part." This does not yet establish that the ultimate ἀρχή must be single. Perhaps when the animal moves

"as a whole" it relies only on the ἀρχαί in the joints and on the unmoving surface outside it. When it moves "part by part" it might use different joint-ἀρχαί each time. The organic unity of the animal may be suggested in the words ὅλον ἄθροον (699^b7), but no conclusions are drawn from this concerning the need for a single, central ἀρχή for all the movements of a single creature.

The intervening chapters have provided a basis for a completion of the physiological account: motion has been argued to be dependent on cognitive processes, which are of necessity accompanied by alterations in the region of the heart. Aristotle seems to rely also on arguments advanced in the *PN* about the central role of the heart region or its analogue in the activity of αἰσθησις (cf. 702^b20–21: καὶ γὰρ τὸ αἰσθητικόν ἐνταῦθα εἶναι φαμεν). He has also shown that it is possible for diverse movements of the limbs to come about as a result of a single alteration in this region, given the way nature has structured animal bodies and their organs. One would think that the natural way for him to argue in chapters 8–9 would be to rely on his findings about αἰσθησις and to claim that only if we understand motion, as well, to be causally dependent on changes in this central area can we understand the linkage between cognitive processes (along with the associated bodily events) and the animal's motion. He does use the argument from αἰσθησις in chapter 9, but only as a support for what he has already concluded using other arguments. He starts, instead, from a different point of view altogether. From the phenomena described in chapter 1, that is, just from the movements of animals that are visible to us, we can, he argues, infer the presence of an internal ultimate ἀρχή in the center of the animal's body. This argument requires us to assume the animal to be a formally unified organic creature of a certain complexity. We could construct a robot with a separate motor in each joint, whose movements would give the appearance of coherence but that need not possess any central ἀρχή. But Aristotle assumes that the creatures in question are goal-directed organic systems, and not collections of separable parts. The claim seems to be that if we see a living creature functioning in a coordinated way in response

to its environment, we can infer without knowing any details about its cognitive faculties that there must be some single central *ἀρχή* that receives incoming information and initiates bodily response. The simile at the end of chapter 10, comparing the animal to a well-ordered city, may provide the needed premise and may be regarded by Aristotle as a presupposition (N.B. *ὑποληπτόν*, 703^a29) of the whole argument. If so, the argument will be very nearly question-begging and certainly will not offer us any criteria for distinguishing an animal from one of the robots just described. All that will be argued is, given that the animal is a formal unity, there must be a central bodily part on which its orderly activity ultimately depends. Even given these limitations, Aristotle argues incorrectly from the unity of the individual to the singleness of the bodily organ that is crucial for its activities.

The argument about joints with which the rest of this chapter is concerned can, then, be seen as at best a clarification of how joints work in “the animal organism” (as Farquharson perceptively translates), and how all their workings are connected to activities in the trunk. It cannot prove that no part of an animal can have separate existence and motor capacity, except on the principle that if some part did it would be not a part, but a separate animal. (Aristotle goes almost this far in chapter 11, 703^b21–22; and cf. 702^a31.) The insects of *DA* I.5 can move, though divided, because there is a capacity for *αἵσθησις* in each part (411^b21), though they are not two separate animals because they lack divisible digestive organs and hence live only a short time in their divided state. This example raises a difficulty for Aristotle’s claim that the kinetic and perceptual capacities must depend on a single central, controlling organ. It seems possible, on the basis of *DA* I.5 to separate the criteria for being a single animal (which include a functioning digestive system) from those for being an independently moving animal segment.

An attempt to resolve this problem is made at *Metaph.* VII.16, 1040^b10 ff., where the animals who can live divided are again discussed. There are origins of movement, Aristotle acknowl-

edges here, in animal joints. This is why some animals go on living in their divided state. But when the animal is functioning as a continuous natural whole, these will not be actual, but only potential, origins (14–15: *ἀλλ’ ὅμως δυνάμει πάντ’ ἔσται ὅταν ᾗ ἐν καὶ συνεχὲς φύσει, ἀλλὰ μὴ βίᾳ ἢ συμφύσει*). The exploitation of the potential-actual contrast allows Aristotle to claim that the case of the *διαιρούμενα ζῶα* will not block the *MA* type of argument for the necessity of a central origin of movement in a creature not, in fact, divided. But it presupposes our ability to distinguish a natural unity from a unity *βίᾳ ἢ συμφύσει* and offers no criteria for distinguishing these. The *MA* arguments, if they do not overlook the difficulty of the *διαιρούμενα* altogether, do require the *Metaph.* arguments to get started, and they seem to share the presuppositions (and the vagueness) of those arguments about the nature of a creature’s unity. A date after that of the *DA*, and near to or after that of *Metaph.* VII, is suggested.

21–22. *τὸ δὲ κινεῖν πρῶτον . . . ἐν τινι ἀρχῇ*. Michael offers a useful summary of this section of the argument:

That the first mover of the animal must be in some origin, all agree. And since joints, too, are origins (as has often been said), he shows that it is impossible for it to be in any of the joints; but the first mover of the animal must be in an origin which is not the origin of one thing and the end of another, but is an origin strictly and simply. This is the heart (120, 21 ff.).

22–23. *ἡ δὲ καμπή ὅτι τοῦ μὲν ἐστὶν ἀρχή τοῦ δὲ τελευτή, εἴρηται*. The *μὲν* after *ὅτι*, found in most MSS, seems inexplicable. The position is odd and no contrasting claim will be introduced. With Farquharson, I prefer the reading of YV.

Each joint can be regarded as the end of one moving part and the *ἀρχή* of the next, these two aspects being distinguishable *λόγῳ*, not *μεγέθει* (cf. note to 702^a30–31, and *DA* III.10, 433^b22 ff.: *ἐνταῦθα γὰρ τὸ κυρτὸν καὶ τὸ κοῖλον τὸ μὲν τελευτή, τὸ δ’ ἀρχή (διὸ τὸ μὲν ἡρεμεῖ, τὸ δὲ κινεῖται), λόγῳ μὲν ἕτερα ὄντα, μεγέθει δ’ ἀχώριστα*—the second *μὲν-δέ*, but not the first, is chiasmic). Farquharson says by way of example that the elbow-

joint is the end of the forearm, the beginning of the upper arm. But though Aristotle does sometimes play on various senses of ἀρχή, we get a better sense here by thinking of ἀρχή as ἀρχή κινήσεως: the elbow-joint will be the ἀρχή of the forearm, the τελευταίη of the upper arm. The passage in chapter 1 (698^b1–2) to which εἴρηται seems to refer says that the ἀρχή *qua* ἀρχή rests while the part below is moved—e.g., the elbow when the forearm is moved, the shoulder when all the arm is moved.

23–24. διὸ καὶ ἔστι μὲν ὡς ἐνί, ἔστι δ' ὡς δυοὶ χρῆται ἢ φύσιν αὐτῇ. Cf. 698^a18–19: καὶ γίνεται τὸ ὅλον μέρος, ἐν ᾧ ἡ καμπή, καὶ ἐν καὶ δύο καὶ εὐθὺ καὶ κεκαμμένον. . . . When the limb is bent, the joint is being used as two: as the end of one segment and the beginning of the other. Cf. 702^a30 and the note on it, and the important discussion at *Ph.* VIII. 8, 263^a24: ἐὰν γάρ τις τὴν συνεχῇ διαιρῇ εἰς δύο ἡμίση, οὗτος τῷ ἐνὶ σημείῳ ὡς δυοὶ χρήται. ποιεῖ γὰρ αὐτὸ ἀρχὴν καὶ τελευταίην.

26–27. ὅτι γὰρ πρὸς ἡρεμοῦν . . . εἴρηται πρότερον. In connection with the discussion of joints, in chapter 1, especially 698^b4–7; concerning the relation between the moving creature as a whole and his environment, in chapter 2.

27–31. κινεῖται μὲν οὖν . . . ἐνεργείᾳ . . . δύο. When the arm bends, the lower end of the forearm (τὸ ἔσχατον τοῦ βραχίονος) moves without moving anything, while in the elbow-joint the “point” that is in the whole segment that is moving (the forearm) is moved, but there must also be in the joint a point that is motionless. This is what we meant by saying the joint is two in actuality. Cf. 698^a21: καμπτομένου δὲ καὶ κινουμένου τὸ μὲν κινεῖται σημεῖον τὸ δὲ μένει τῶν ἐν ταῖς καμπαῖς. At 703^b32–33, where both segments move simultaneously, both “points” in the hypothetical juncture are said to be moved movers. Farquharson and Torracca (the former hesitantly) defend the reading of Γ, τὸ μὲν κινεῖ καὶ κινεῖται, pointing for support to 703^a12–14: τοῦτο (sc. the *pneuma*) δὲ πρὸς τὴν ἀρχὴν τὴν ψυχικὴν ὅμοιως ἔχειν ὥσπερ τὸ ἐν ταῖς καμπαῖς σημεῖον, τὸ κινεῖ καὶ κινούμενον, πρὸς τὸ ἀκίνητον (cf. note *ad loc.*). This is, however, not as good a parallel as 698^a21 and *DA* 433^b22: the desire to construct a parallel with *pneuma*, the

bodily “moved mover” *par excellence*, could have led Aristotle to accord some derivative power of imparting motion to what he usually regards simply as the moved part. At 703^b32–33, when he says that both ἀρχαί are moved movers, he means that since both segments are in motion, each hypothetical point is in motion *qua* being in the segment that is moved, but a mover *qua* being in the other segment. It seems, then, preferable to follow the better attested reading. The ἀρχή of motion, *qua* ἀρχή, is at rest (698^b1).

30–31. δὲ δὴ φαμεν δυνάμει μὲν ἐν εἶναι σημεῖον, ἐνεργείᾳ δὲ γίνεσθαι δύο. Cf. 702^b25–26: τὸ δὲ μέσον τοῦ σώματος μέρος δυνάμει μὲν ἐν, ἐνεργείᾳ δ' ἀνάγκη γίνεσθαι πλείω, and 702^b30–31: ἐν ἄρα δυνάμει ὅν τὸ Α ἐνεργείᾳ δύο ἔσται, ὥστ' ἀνάγκη μὴ στιγμὴν ἀλλὰ μέγεθος τι εἶναι. But contrast 703^b29 ff.: αἱ οὖν κινήσεις καθ' ἑκαστον στοιχείον τῶν ἐπιγεγραμμένων ἐπὶ τὴν ἀρχὴν ἀφικνούνται, καὶ ἀπὸ τῆς ἀρχῆς κινουμένης καὶ μεταβαλλούσης, ἐπειδὴ πολλὰ δυνάμει ἔστιν. The point seems to be that the joint *qua* joint is single, and the ἀρχή in the joint likewise (the stick argument below depends on the potential unity of mover and moved), but that whenever it is actually functioning it is two, since there are two bodily parts involved. δυνάμει ἐν means simply that we can describe it as a unity, a single joint, in virtue of its having a single specifiable role to play in the organism, though at no time during its actual functioning is it a single whole. (The *DA* uses ἀριθμῷ interchangeably with δυνάμει to describe the unity of a bodily organ, and εἶναι with ἐνεργεῖσθαι—cf. 427^a2, 7.) The discussion of joints in *DA* III.10 (cited *supra*) makes a slightly different point: the parts in the ball and socket joint are μεγέθει ἀχώριστα, λόγῳ ἕτερα (433^b24). That is, the two parts fulfill specifiably different roles (one is at rest, the other in motion), but *qua* parts of a joint they cannot be separated.

As for the *MA* 11 passage: the inconsistency would be serious if Aristotle had said the ἀρχή was potentially plural, actually one. But since he says only the first, we can understand it in a way consistent with the above. The ἀρχή (the heart region, or the “point” that substitutes for it in the diagram) has a capacity

to *become* plural in action (cf. the passage under discussion and 702^b30–31). If it *becomes* plural in actuality, it can be inferred to possess a capacity for becoming plural. ἐνεργεία X does not, in Aristotle's terminology, imply ~δυνάμει X. There is room for confusion here, but no real inconsistency.

31–32. ὥστ' εἰ τὸ ξῶν ἦν ὁ βραχίον . . . ἡ κινούσα. In the arm, the point of rest necessary for motion is in the elbow: so if we looked at the limb as a simple, separate moving creature without asking about the dependence of this motion on other processes in the rest of the creature, we would locate the ἀρχή here. Now Aristotle will attempt to show that because this limb is connected to the trunk so that it can itself be moved like an inanimate object by what is "higher," this is not the central ἀρχή. Aristotle very nearly makes explicit the premise of his argument: the animal is a complex, formally unified creature; no limb can be studied in isolation from the rest of the body (cf. the discussion p. 360 *supra* of *Metaph.* 1040^b10 ff.). On ἡ ἀρχὴ τῆς ψυχῆς, cf. Essay 3.

31–702^b11. ἐπεὶ δ' ἐνδέχεται . . . ἅπαν τὸ κάτω συνεχές. For language of soul—"location," see Essay 3. The point of the stick argument is to show that the soul cannot be "in" a joint because it cannot be associated with a part that can be moved like an inanimate object by something "higher up." In other words, it cannot be in any origin that is also the end of something else. If the soul were pictured as "in" a joint, it would have to be associated primarily either with the last point of the moved part or, more likely, with the resting ἀρχή in the higher part; in any case the joint, *qua* joint, will be potentially one. The absurdity seems to stem from the notion that it will be necessary, on the joint theory, to say that psychic activities are causally dependent even on a juncture between a living and a lifeless part—in this regard we cannot distinguish τὰ προσπεφυκότα from other parts (702^b4–5). Suppose a man holds a stick in his hand. Obviously psychic activities could not be associated primarily with the ἔσχατον τοῦ κινουμένου (702^a35–36)—i.e., with the point of the lifeless stick where it touches the hand. We would expect Aristotle to go on to say that it cannot be in the corre-

sponding point in the hand either, since it would be absurd to suggest that the "presence" of soul in a part depends on the part's holding an inanimate object; and, further, since any joint is a potential unity, to connect it with the ἀρχή in the hand is to connect it with some combination of flesh and stick. In other words, if we admit the possibility that an independent origin of movement can be in a joint between two moving parts, one of which moves the other like an object, we commit ourselves to the absurd consequence that there can also be one in the juncture—not a genuine unity—between the living part and an inanimate object. We could try to block this argument by denying that there is no crucial difference between the attached and the non-attached: one joint is a genuine unity, the other no joint at all. But Aristotle would reply that unless we accept his principle of organic unity, which commits us, he believes, to a single ἀρχή, we have no good way of distinguishing limbs from separable appendages like sticks. What makes them different in fact is their connectedness to the other parts of a whole living organism.

The argument Aristotle actually provides here is very unclear. I have given what I believe are the important steps, in its most plausible version. Take D to be the far extremity of the stick, C its point touching the hand, B the corresponding point in the hand, A the wrist. At 702^a35, ἔσχατον could be either D or C. If D, then τῇ ἐτέρᾳ ἀρχῇ is C; if C, τῇ ἐτέρᾳ ἀρχῇ is B. I prefer to read it as C, τῇ ἐτέρᾳ ἀρχῇ as B, since D could not properly be described as an ἀρχή at all; and otherwise the argument will never make the point about the potential unity of the joint, which is surely the whole purpose of the stick example. The stick has, then, an ἀρχή in the hand and an endpoint or τέλος touching the hand (702^a36–b1); the joint is a potential unity. Then follows, ὥστε διὰ γε τοῦτο, εἰ μὴ καὶ ἐν τῇ βακτηρίᾳ ἡ κινούσα ἀπὸ τῆς ψυχῆς ἀρχὴ ἐνεστίν, οὐδ' ἐν τῇ χειρὶ. This looks as though it reaffirms the same point more explicitly. If ἔσχατον at 702^a35 were D, it could be read as making the further point that it is not in B either: for (D:B) = B:A = A:elbow.

This reading, however, makes the introduction of the stick

pointless. The argument from potential unity is ignored in favor of arguing directly that the origin cannot be in any joint that is at the end of another segment. But it was to help establish this that the stick example was invoked.

On our reading, 702^b1–2 must make the further point that if the soul is not “in” the stick-hand joint (N.B. *καὶ ἐν τῇ βακτηρίᾳ*, difficult on the other reading) it is not in the wrist-joint—i.e., in the point of the hand where it joins the forearm. For (702^b3–4) the far end of the hand is the end of a segment that is moved from the wrist (just as, in the preceding example, the far end of the stick would have been the end of the segment moved from the finger-joint. The sentence *ὁμοίως γὰρ ἔχει . . .* must then be read, “For the relation between the extremity of the hand and the wrist is the same (sc. as the relation of stick-end to hand-“juncture” that we have just discussed), and so is that of the wrist to the elbow.” *τὸ ἀκρὸν τῆς χειρὸς* must, then, be a joint in the end of the hand, from which the stick is moved—i.e., a joint in the fingers. This is implicitly contrasted with the end of the moved stick. But stick end: finger joint = this joint: wrist = wrist: elbow. In each case, we cannot say that the *ἀρχὴ κινήσεως* is in the former of the pair, since this joint is the far end of a segment that can, itself, be moved like an inanimate object from the joint above. The emphasis here on the *far* end of the stick (unprecedented in the argument, on our reading) is a way of setting up the parallel; and Aristotle ends by giving *two* reasons why the far end of the hand cannot be the *ἀρχή*: (1) it forms a juncture with the stick that is a potential unity, and (2) it is the end of a segment that is moved like an inanimate object from above. The second argument serves also to establish that it cannot be in the joint where this quasi-inanimate member meets the next higher one—for any argument to support its placement there could be used to show it is in a stick. Aristotle concludes that the soul cannot be “in” any origin that is the end of something else (702^b6–7), not even if there is another part beyond it further from the center: e.g., it cannot be in the finger-joint, which is the *ἀρχή* for the end of the stick

(because this is the “end” of the whole hand), nor in the wrist, which is *ἀρχή* for the end of the hand (because this is the end of the forearm) (702^b7–11).

The stick argument has a serious defect: it assumes that when I move a stick in my hand there is some “joint” between stick and hand that comes to be crucial in the motion. In fact, whether I move the stick from my wrist (as in Farquharson, cf. *infra*), or wiggle it with my fingers—as seems to be the case here—it is the joints in my hand that are operative, and the stick is like an extension of hand or fingers. But Aristotle could have used the 702^b3–4 proportion happily without introducing the stick, to indicate that we must always look further up for the ultimate origin, if he had not wanted to make a point about the stick-hand juncture. Interpreters, especially Farquharson, try to avoid ascribing this misleading picture to Aristotle. Farquharson’s view is implausible: the *ἀρχή* in 702^b1 ff. is the wrist. He supports this with the claim that *χείρ* is used here “as often in Greek” with the meaning “wrist”—a claim for which I can find no evidence, in Aristotle or other authors. Farquharson must then take the *ὁμοίως* sentence differently, as he does: “For a precisely similar relation obtains between the hand and the wrist as between the wrist and the elbow.” This has the same defect as our rejected reading: the impossibility of the ultimate *ἀρχή*’s being in the proximate *ἀρχή* of the stick is shown from the impossibility of its being in any limb that has any other part “above” it. But it was to show *this* that Aristotle invoked the example. The argument as read by Farquharson is, further, completely question-begging: from the unsupported statement that it cannot be in the hand because there are parts higher up, it is inferred, as a general principle, that it cannot be in any *ἀρχή* that is the end of something else. Only on the other interpretation of *ὁμοίως* is Aristotle making a reasonable argument, though flawed by physiological unclarity. Had Aristotle considered the much more apposite question of artificial limbs, he would have been forced to clarify his criteria for calling something a part of a living organism a great deal more than he now does.

Is it the materials and the presence in them of blood circulated from the heart that make a limb a part of an organically unified creature, or the function it performs?

9. *τούτου δ' ἐν τῷ καρπῷ*. No commentator remarks that we have to supply, as referent for *τούτου*, τοῦ τῆς χειρὸς ἐσχάτου. Only Louis translates it as though he noticed this fact.

CHAPTER 9

Regarding it as established that there are not multiple independent principles of motion in the joints, Aristotle now employs an argument from symmetry to establish that the origin of movement for both the left and the right sides of the animal is in the middle of the trunk. He supports this by appealing to arguments about the physiological processes accompanying sense-perception and the connection between sense-perception and motion. Finally he emphasizes that a material description of this central region and the changes in it is not sufficient to show how it, or the animal whose motions depend on it, is a unity. For this, we must give a general formal account of the animal's life-processes.

In this chapter more than in any other, Aristotle's use of schematic mathematical models obscures his account of the biological facts.

On the reference to soul-“location” at 703^a3–4, see Essay 3, pp. 152–54.

702^b12–16. *ἐπεὶ δ' ὁμοίως ἔχει . . . τῆς κινούσης*. Animals are symmetrical and can move both left and right at once. We cannot simply say, therefore, that it is in virtue of the right side's remaining at rest that the left is able to move. We must find a motionless origin in what is “higher” than both—i.e., in the middle. There are a number of difficulties in this argument: first, Aristotle does not make it clear what he means by movement of right and left. If only movement of limbs, why can there not be separate *ἀρχαί* for the motions, e.g., of the right arm and the left? Both will be in the trunk, but neither need be in the middle of the trunk. But we can hardly imagine that Aristotle was so misled by his schematic picture of right-left-center that he suggests the animal moves both sides of his trunk by folding down the middle, as if at a kind of joint. He uses schematic models throughout this treatise so as not to pin himself down to details about particular species and to make the dis-

cussion simpler and more elegant. But here in particular, the procedure leaves us very unclear as to just what parts are in question. If he is talking about swinging the upper trunk or the hips, he should make this more specific, and show just how this would establish that the *ἀρχή* is in the heart region. The best solution seems to be that he is indeed talking primarily about limbs; he assumes for this argument, too, that there is a single ultimate *ἀρχή* and shows only that the animal's symmetrical design guarantees that it is somewhere in the trunk. He has not really argued for its being in the middle of the trunk—though he might have claimed that motion of left and right could be most economically imparted from an *ἀρχή* equidistant from the two sides. Elsewhere we learn that to speak generally of the heart's being "in the middle" does not imply that it is strictly so: it is, in fact, more on the right (*IA* 705^b18–20), except in men (*PA* 666^b6–8), and slightly towards the upper and the forward regions (665^b18–20). General teleological arguments about the "honorable" status of these locations are given in support of these claims. The *DC* introduces a distinction between "the middle of the animal," i.e., the heart region, and the middle of its body (293^b6–7), i.e., the physiological center strictly understood, probably the center of gravity. The arguments so far serve, then, only to establish that the *ἀρχή* is in the trunk, but not to locate it more precisely within the trunk.

A further problem: Aristotle does not tell us why the fact that left and right move together shows that it is not in virtue of some "resting" *ἀρχή* on the right that the left moves and *vice versa*. Numerous *ἀρχαί* in the body (and externally) that serve as "resting" origins for motion are at the same time moved in some other way. The *DA*'s distinction between *καθ' αὐτό* and *κατὰ συμβεβηκός* motion should enable us to say that it is in virtue of the right's remaining at rest that the left is moved, though incidentally it may itself be moved with some other motion. It is, once again, only the assumption that there is a single *ἀρχή* ultimately responsible for the motions of both left and right that enables Aristotle to bypass this possibility.

For the impersonal use of intransitive *ἐχειν* with adverb, cf.

HA 505^a20, *PA* 646^a25, *Pol.* 1284^a35, and many others. Farquharson's attempt to supply *ζῶον* as subject is unnecessary.

16–17. *ἀμφοτέρων γὰρ τῶν ἄκρων τὸ μέσον ἔσχατον*. The middle is the border or limit of two extremes; so if we trace the origin of motion back from both sides, we stop when we get to the middle. Cf. *DC* 312^a10: *ἔστι γὰρ ὡς ἔσχατον καὶ μέσον ἀμφοτέρων τὸ μεταξὺ*. *EN* 1107^a20 ff. uses the same paradox to deny that there can be excess or deficiency of virtue: *ὥσπερ δὲ σωφροσύνης καὶ ἀνδρείας οὐκ ἔστιν ὑπερβολὴ καὶ ἔλλειψις διὰ τὸ τὸ μέσον εἶναι πῶς ἄκρον, οὕτως οὐδ' ἐκείνων μεσότης οὐδ' ὑπερβολὴ καὶ ἔλλειψις* (1107^a22–24).

17–20. *ὁμοίως δ' ἔχει . . . τοῖς ἐχουσι ῥάχιν*. The middle part is similarly (i.e., similarly to the way it is related to movements from left and right, hence symmetrically) related to motions from above and below and also to the various movements that proceed (so to speak) from the spine in creatures that have a spine. Having argued that the origin of motion from left and right must actually be in a middle section of the body and having suggested that it is more or less equidistant from both (16–17), Aristotle now extends the discussion of symmetry: it should also be more or less centrally located with regard to up and down and also with regard to all those motions involving bones that are attached to the spine in creatures that have a spine. This last is an argument for finding it in the center of the trunk—i.e., higher than the "center" for the whole body, including legs. In other words, this argument, more than those that preceded it, gives support for the actual location of the heart within the body, in particular for its being higher than the body's center of gravity (cf. *PA* 665^b18–20). (All directional expressions are used relatively to the physiology of the creature in question: the distinction is one of function, not of position—*IA* 705^a29 ff. In addition there are some animals, notably man, whose functional directionality accords well with the directions in nature—706^a24–26. On the text of this passage, cf. *HSCP*, pp. 154–55.

20–25. *καὶ εὐλόγως . . . τοῖς ζῴοις*. This is the first substantial argument for the central dependence of motion on changes

in the region of the heart (cf. note on 702^a21). But Aristotle brings it in as a supportive, peripheral consideration. On the connection between perceptual changes and motion, cf. Essay 3. For the heart (or its analogue) as *πρῶτον αἰσθητήριον* (most directly connected with taste and touch, less directly with the other senses as well), cf., for example, *PA* 647^a24 ff., 656^a27–29, 678^b1–4, *Sens.* 438^b30–439^a5, *Somm.* 455^b34–456^a2, and especially *Juv.* 468^a13–469^b20, where the heart is said to be *ἀρχή* for all the nutritive soul and for growth as well, and where an argument for its being in the middle section is based on its importance for nutrition.

25–703^a3. τὸ δὲ μέσον . . . ἐν τούτῳ δ' οὐσα. Aristotle has argued from the organic unity of the creature to the need to postulate a single region of the body that will be the center for the reception of perceptual stimuli and the initiation of kinetic responses. He reminds us now that this physiological area, being, like any *μέγεθος*, divisible, does not suffice to explain the animal's unified, coordinated pursuit of a goal. If we gave explanations of motion with reference only to organic changes and their necessary results, there would be cases in which diverse motions were being generated by changes in this region (he calls it A). In such a case we will have to say that A has no unchanged region, but that both of its sub-regions impart motion being themselves changed. If we did not give a teleological explanation of these motions, i.e., if we did not make reference to psychic faculties and to some unmoved goal, we would not have succeeded in describing a living organic creature, but a mechanical thing that is more like two men pressing their backs together than it is like a formal unity. There must be something unitary in the case of each single creature, in terms of which all his diverse motions are explained: this is the soul (i.e., the systematically organized goal-directed capacities of the living creature), which is to be distinguished from the central *μέγεθος*, but whose operations are causally dependent on it.

This last step leaves Aristotle's preceding arguments in questionable shape. If the positing of a single central *ἀρχή* was

not sufficient to secure formal unity, does formal unity even require it? It seems possible for soul to be "in" a plurality of bodily parts; the *ἀρχή* region itself has now been shown to be a plurality of sub-areas. Whether or not the bodily *ἀρχή* is single, and where it is, should be an empirical question for the physiologist, whose answer is not predetermined by our choice to explain the animal's activities teleologically.

Louis observes that Michael (126, 15–25), whom he oddly, however, calls Philoponus, does not seem aware of the last sentence. He mentions Carteron's contention¹ that it is a gloss. I concur with Louis in rejecting this supposition.

25–26. τὸ δὲ μέσον . . . γίνεσθαι πλείω. On this use of *δυνάμει* and *ἐνεργείᾳ* cf. note on 702^a30.

703^a2. ἀναγκαῖον (ἐν) εἶναι. Cf. William: "Set movens ambo necesse esse unum" and Albertus Magnus (Borgnet X, 343): "oportet autem in omnibus talibus, quod unum aliquid sit primum movens ambo." Farquharson and Torraca, on this authority, insert *ἐν*. Louis and Forster do not emend the passage; the former ascribes *ἐν* in his apparatus to the authority of Leonicus, rather than to the much greater authority of William. (He errs similarly with the omission of *καὶ κάτω* at 702^b18.) Jaeger inserts *ἀκίνητον*. But then this is just a repetition of 702^b34–35. *ἐν* seems necessary to make sense of the argument.

¹ Carteron, *La notion de force*, 121.

CHAPTER 10

Aristotle adds a correcting supplement to his previous account of psychological and physiological processes: the activities of desire are realized in the motions of a crucially important bodily element, the connate *pneuma*. Its rôle in enabling the animal to have the “strength” to move and its relation to the other elements are discussed. The chapter concludes with the comparison of the animal to a well-ordered city: its vital processes are causally dependent on a single central region and especially on the activities of *pneuma* in that region. In virtue of their connection to this central region, the limbs are naturally able to perform their functions.

This chapter and its relation to chapters 6–9 form the subject of Essay 3. Below are supplementary notes.

703^a9–10. πάντα δὲ τὰ ζῶα . . . καὶ λαχύνοντα τούτῳ. There are a number of passages where Aristotle seems to ascribe importance to *σύνφυτον πνεῦμα* only in animals who do not breathe. It serves as the analogue of breathed-in air in their vital processes (*PA* 659^b13–18, 669^a1–2, *Somn.* 456^a11–13, *Juv.* 475^a8). But Jaeger is right to insist that it is wrong to restrict its operations to these.¹ He refers to *GA* 741^b37 ff., where Aristotle makes an observation about the activity of the *σύνφυτον πνεῦμα* in differentiating the embryo. This function, he observes, is obvious in the case of the lower animals, but he implies that it should be regarded as established for others as well (cf. *PA* 669^a1–2, where the same seems to be true). The important passage about the role of the *πνεῦμα* in transmitting the capacity for sense-perception (*GA* 736^b33–737^a1), passages that accord it importance in actual perception (744^a3, 781^a24), and the very general passage that claims that nature uses it as a “tool” in every process (*GA* 789^b8–9) include no restriction to a certain type of creature. In his work on respiration, Aristotle is

interested in *pneuma* mainly because it provides the analogue to actual respiration in bloodless creatures. But he never restricted it to these, probably not even in its respiratory role and certainly not in any of its other very important functions.

10–11. τίς μὲν οὖν ἡ σωτηρία τοῦ συμφύτου πνεύματος, εἰρηται ἐν ἄλλοις. A number of commentators, following Zeller and Bonitz,² have taken this to be a reference to the opening of the pseudo-Aristotelian *De Spiritu* (481^a1: τίς ἡ τοῦ ἐμφύτου πνεύματος διαμονή, καὶ τίς ἡ αὐξήσις; Rose long ago denied this claim, even while arguing on other grounds for the non-Aristotelian authorship of the *MA* (cf. Part I, chapter 1). The *De Spiritu* is a confused and inferior late work that does not even profess to be by Aristotle and acknowledges its late date by reference to the theories of Aristogenes of Knidos, who wrote around the middle of the third century B.C. Its opening question may possibly contain a reference to the *MA*, as Farquharson claims, but it is impossible that the learned author of the *MA*, even if not Aristotle, would denounce his carefully Aristotelian work as a forgery by reference to this obviously late treatise. Jaeger shows at length that the theory of *pneuma* advanced in the *MA* does not even resemble the theory of the *De Spiritu*.³

The reference can be explained in other ways. Michael ascribes it conjecturally to a lost treatise on nutrition: περὶ δὲ τῆς τοῦ πνεύματος σωτηρίας οὐκ εἶον ἦν εἰπεῖν ἐν τοῖς περὶ τροφῆς (127, 16–17). Evidently he is not in possession of this work, but has inferred from a number of references in other works (*DA* 416^b30, *Somn.* 456^b2, *PA* 650^b10, 653^b13, 674^a20, 678^a16, *GA* 784^b2, *Meteor.* 381^b13) that Aristotle either wrote one or planned to write one. The question of whether or not there was a treatise περὶ τροφῆς has been studied by Heitz, Carteron, and Louis⁴ (cf. also the remarks of Simplicius, *In DA* 116, 16, who

² Zeller, *Phil. der Gr.*, II 2³ 97.A.2; Bonitz, *Index*, s.v. πνεῦμα.

³ Jaeger, “Pneuma,” *passim*.

⁴ Heitz, *Die verlorenen Schriften*, 59–61; Carteron 78, n. 405; Louis, “Le traité d’Aristote sur la nutrition,” 29–35.

⁵ Torraca, “Sull’ autenticità,” 228–29. Cf. Part I, chapter 1.

¹ Jaeger, “Pneuma,” 46.

takes the *DA* forward reference to be to the *GA*). Heitz and Carteron incline to the view that there was such a separate treatise. Louis, from the difficulty of fitting the forward and backward references to this treatise into a reasonable chronology of Aristotle's works, concludes there was a very early draft, to which the *Meteor.* makes back-reference, but that subsequently Aristotle planned a more exhaustive treatment, which the *GA* forward reference shows was never completed. (The *Somm.* back-reference is taken to refer to the *PA*.) I incline to the view that a separate treatise on the subject was never written. Some of the references may be to sections of the *GA* or *PA*, though the forward reference in *GA* 784^b2 does seem to indicate Aristotle had at least formed the plan of writing a separate work on this theme. But whatever the truth is, it is unnecessary to refer to this lost treatise for a solution of this problem. Torraca's proposal that we consider the reference to be to the discussion of the process of pneumatization described in *Resp.* 479^b17–480^a15 is not immediately appealing, since there is no reference there to the *σύμφυτον πνεῦμα*, and the whole discussion is intended to explain the pulsation of the heart. But *GA* II.6 explains the presence of *πνεῦμα* in the body as necessarily resulting from the interaction of the hot and the cold: *πνεῦμα δ' ὑπάρχειν ἀναγκαῖον, ὅτι ὑγρὸν καὶ θερμόν, τοῦ μὲν ποιούντος, τοῦ δὲ πάσχοντος* (742^a14–16). This is the sort of explanation we want, but a back-reference to the *GA* seems dubious on chronological grounds. Our reference may be a later insertion in view of the *GA*'s writing on *πνεῦμα*, or the reference may indeed be to the *Resp.* passage (which, after all, gives an account of the hot and cold very similar to that cited from the *GA*), but read as offering a general explanation for the renewal of *πνεῦμα* in the body, applicable to the *σύμφυτον πνεῦμα* in the *MA* as well as to the particular activities it is invoked there to explain. Equally promising is a passage of the *Somm.* that links a discussion of the *σωτηρία* of the vital heat by pneumatic cooling to a discussion of the heart area in its role as *ἀρχὴ κινήσεως*: *τῆς μὲν οὖν κινήσεως φανερόν ὅτι καὶ ἡ τοῦ πνεύματος ἀρχὴ καὶ*

ὅλως ἢ τῆς καταψύξεως ἐστὶν ἐνταῦθα, καὶ τὸ ἀναπνεῖν τε καὶ τὸ τῷ ὑγρῷ καταψύχεσθαι πρὸς γε τὴν σωτηρίαν τοῦ ἐν τούτῳ μορίῳ θερμοῦ ἢ φύσις πεπόρικεν (456^a6–10).

11–14. *τοῦτο δὲ . . . πρὸς τὸ ἀκίνητον*. That is to say, the *pneuma* is physically inseparable from the *ἀρχή*, though its function is different. The alterations in the *ἀρχή*, associated with perception or thinking, stimulate the activity of *pneuma*, which, in turn, sets up new alterations that lead to motion. That it is the inseparability of *pneuma*, geographically, from the *ἀρχή*-area that is in question here is clear from the inference that follows: since the *ἀρχή* is in the region of the heart or its analogue, the *pneuma* is obviously there too.

16–18. *πότερον μὲν οὖν . . . καὶ περὶ τῶν ἄλλων μορίων*. Another obscure reference. This is actually the one much more likely to point to the *περὶ τροφῆς*, or at any rate to those discussions of nutrition in *GA* II.6–7 and V.4 that lead Aristotle to make a forward reference to this treatise: *ἀκριβέστερον δὲ περὶ τῆς τοιαύτης αἰτίας ὕστερον λεκτέον ἐν τοῖς περὶ τροφῆς* (784^b2–3). Other general discussions of the renewal of bodily parts by nutrition and circulation can be found in *PA* II.3 and IV.4.

19–20. *τὰ δ' ἔργα τῆς κινήσεως ὥς καὶ ἔλξις*. The prospective summary of the *MA*'s contents in *DA* III.10 remarks: *πάντα γὰρ ὥσει καὶ ἔλξει κινεῖται* (433^b25–26). Cf. *IA* 704^b22–23: *τῶν κινήσεων τῶν κατὰ τόπον ἀρχαὶ ὥς καὶ ἔλξις*. *Ph.* VII.2 first names as the four basic kinds of being-moved by something *ἔλξις*, *ῥῥις*, *ὄχησις*, and *δίνησις* (243^a16–17), then reduces the latter two, in turn, to *ῥῥις* and *ἔλξις* (243^b16–244^a6).

22–23. *καὶ γὰρ ἀβλαστος . . . καὶ ὥστικῃ*. Farquharson's two emendations vastly improve the passage (cf. *HSCP*, pp. 156–57).

25–26. *κρατεῖ γὰρ κατὰ τὴν ὑπεροχὴν τὰ φυσικὰ σώματα ἀλλήλων*. For *φυσικὰ σώματα* as the elements or bodies composed of them (i.e., bodies having some natural motion), cf. *Ph.* 208^b8–9 and *DC* 268^b14–15, 274^b5, 304^b14. Compare to this passage *DC* 268^b29–269^a2: *ἀνάγκη καὶ τὰς κινήσεις εἶναι τὰς μὲν ἀπλᾶς, τὰς δὲ μικτὰς πως, καὶ τῶν μὲν ἀπλῶν ἀπλᾶς, μικτὰς δὲ τῶν συνθέτων, κινεῖσθαι δὲ κατὰ τὸ ἐπικρατοῦν*, and 269^a28–30:

τῶν γὰρ μικτῶν τὴν φορὰν ἔφαμεν εἶναι κατὰ τὸ ἐπικρατοῦν ἐν τῇ μίξει τῶν ἀπλῶν.

29-703^b2. ὑποληπτέον . . . διὰ τὴν φύσιν. This important passage has been used to impugn the authenticity of the treatise and to cast doubt on its compatibility with the *DA* (cf. Part I, chapter 1). For an interpretation of it in its context and an analysis of parallel passages, see Essay 3.

CHAPTER 11

The introduction of the *σύμφυτον πνεῦμα* and the city simile have concluded Aristotle's account of goal-directed local motions, which has analyzed the combination of cognition and desire required for action and has also discussed the suitability of the animal's physiology for functioning in the ways necessary if purposive motion is to be accomplished. But there are some changes in the living creature that are in response, directly or indirectly, to some stimulus from the environment and may serve an important purpose in the overall functioning of the creature, but in which, nonetheless, desire and practical thinking cannot be said to be genuinely involved. The animal can in these cases be seen to respond automatically, like a machine, and the motions will depend only on the interaction of external stimulus and internal bodily disposition (or, as Aristotle puts it, the presence of a sufficient amount of the right kind of *παθητικὴ ἔλξη* (704^a1)). None of the changes described involves locomotion of the entire creature, except incidentally (as when one lies down to sleep). A diagram is offered to explain the central role of the *ἀρχή* in receiving perceptual stimuli and directly initiating motor responses. To conclude, Aristotle summarizes the progress of his course of study, and points to the next topic—the generation of animals.

703^b2. πῶς μὲν οὖν . . . εἴρηται. Commentators casually refer to *EN* III.1 (cf. also *EE* V.7, *Rhet.* I.10) as though the same distinction between the voluntary and the non-voluntary is in play. This is not at all obvious. We find here no discussion of ignorance or regret; the *hekousia* of the *MA* may, for all we know, be done in ignorance of relevant facts and either be followed by regret or not. Even if the agent is acting under duress, except in the extreme case where he is carried by the wind or picked up and thrown, his limb movements can still be voluntary. Involuntary *motions* of the *MA* sort could, on

the other hand, occur in connection with voluntary and involuntary actions.

But the parallel is not incidental, and the basic point in view is the same in the two discussions. The important distinction is between actions or motions to explain which we have to mention the agent's desire and his view (his *phantasia*) of the goal, and those that are adequately explained by a mechanistic stimulus-response account. *Physics* VIII had decisively adopted the latter picture for certain animal motions; sleeping, waking up, growth, decay, respiration, and digestion are cited there as changes whose origin is in the environment only and not in the animal (253^a11–21 and 259^b1–16; cf. Essay 2). The account there seems to toy with the idea of extending this analysis to local motion—a move that Aristotle apparently makes in *EE* II.8 for all non-rational movements. All voluntary motion, he claims, is rational motion, and *praxis* is to be denied to children and animals, who are simply pushed about by a *hormē*. *Metaph.* IX.2 and 5 seem in similar fashion to set off the rational capacities from the non-rational and argue that actualizations of the former alone must be explained with reference to a desire. But in *EN* III.1, Aristotle explicitly recants: the claim that all non-rational motions are *akousia* is misleading because it leaves out animals and children, whose movements do, in most cases, have to be explained with reference to desire. It appears anomalous, Aristotle now says (*EN* 1111^a24 ff.), to call involuntary any movement towards an object of desire. Such movements are not sufficiently explained as mechanical responses to external stimuli. The *archē* in all such cases is in the agent (1110^b9–15, 1113^b17), in that, to explain the action adequately, we have to mention the agent's desires and their object—and not under just any description, but under its intentional description for him. We speak not just of a good, but of the agent's *phantasia* of the good (*EN* 1114^a31 ff., cf. Essay 5).¹ In this section of the *MA*, Aristotle reaffirms that view, setting off all the cases of intentional activity that he has just analyzed from (1) cases where

desire does not have to be mentioned, although the appearance of the object may (the *akousioi*), and (2) the cases cited in *Physics* VIII—sleeping, waking up, respiration, etc., in which neither *orexis* nor *phantasia* seems to play an important role. Of course the *phantasia* may be mistaken, and then the action, though voluntary under the description under which the agent does it, may be involuntary under the correct description. But that is a problem Aristotle confronts elsewhere.

Cherniss² cites *MA* 11 as evidence that the threefold distinction of motions into natural, enforced, and voluntary in *De Philosophia* fr. 24 is genuinely Aristotelian and apparent well beyond the earlier works. He takes the *MA* ἀκούσιον to be a species of the *De Phil.* βλαιοιν, the *MA* οὐχ ἐκούσιον to be equivalent to the *De Phil.* κατὰ φύσιν. He cites 700^b29–32 as evidence that even in the *MA* the motion of the heavens is voluntary in the *De Phil.* sense. Cherniss seems to be right about the distinction between natural and voluntary in the *MA*: the motion of the heavens is more than just a natural motion (cf. Essay 2). And the οὐχ ἐκούσιοι of chapter 11 do resemble natural motions of physical bodies in that they go on regularly according to the laws of matter and are not governed by any conscious goal-directed activity of the subject. But the ἀκούσιον is not exactly the βλαιοιν, for these motions are the natural responses of a naturally constituted organism to certain stimuli from the environment.

4–5. κινεῖται δὲ τινες καὶ ἀκούσιους . . . οὐχ ἐκούσιους. The distinction is not drawn very clearly. It is crucial to observe that for each group Aristotle first offers examples (6, 8–9), then, in a parenthesis joined to what precedes with a γάρ (7–8, 9–11), gives us, in each case, the reason why the examples deserve the title he has given them. Editors generally print πολλάκις . . . κινούνται in parentheses, but Torracca and Forster, and probably also Louis, Buridan, and Michael, take οὐθενός . . . ὁρεξίς to refer to both the involuntary and the non-voluntary. Albertus and Farquharson see it, correctly, as an explanatory aside

¹ Cf. Furley, "Self Movers," and Essay 2.

² Cherniss, Appendix X, 597.

parallel to *πολλάκις . . . κινούνται*, applying only to the non-voluntary. This must be right, since *phantos tinos* contrasts implicitly with the denial that *phantasia* is involved in the second case. The following distinctions have been set up: (1) The involuntary are motions of single bodily parts (4–5), the non-voluntary are systemic (from the examples). (2) The latter are more numerous or more frequent than the former (5). (3) The involuntary are occasioned simply by the appearance of something to the animal, and involve no decision to pursue the object. The non-voluntary involve neither choice nor any sort of desire, and they do not even involve *phantasia*.

The involuntary motions are not goal-directed actions, but sudden stimulus-occasioned responses of particular parts. In *DA* III.9 (432^b28 ff.), where a similar contrast is made, Aristotle insists that the leap of the brave man's heart from a sudden fright can be explained without our saying he was deficient in courage, since there is no real "command" to avoid the object (432^b29 ff.). But in order to explain the leap we still need to mention his *phantasia* of the object—it looked to him like an enemy beacon or his heart would not have leapt—and also some sort of low-level or pervasive desire. Aristotle seems to assume here that there are certain desires that are innate and present in all men; among these are sexual desire and the desire for self-preservation. A virtuous man will still have these desires at the level of instinctive bodily response; but his virtuous disposition will not allow him to identify himself with them in inappropriate circumstances. We cannot infer from the fact that a soldier's heart skips a beat that he is at all a coward; inclination to take evasive action, and not the low-level bodily impulse, will be the test of virtue. (A self-controlled man will have the inclination, but fight it; a vicious man will run.) No praise or blame at all can be ascribed because of the occurrence of a heart-leap or a momentary erection, even though we concede that to explain them we must invoke *phantasia* and, at some level, *orexis*. But if the agent identifies with his desire and makes the appearance an object of pursuit or avoidance, the motion becomes part of a project for which he will be blamed or praised.

(Michael makes interesting use here of the Stoic notion of "assent" (*sugkatathesis*) to a perceptual stimulus—128, 20 ff.)

The non-voluntary motions are the ones that had already engaged Aristotle's attention in the *Physics*: natural bodily processes, to explain which we need only describe objectively the interaction between the animal's physiology and his environment. These processes go on whether or not the animal is attending to or desiring anything in the environment; we can explain respiration or sleep without saying how the world looks to the animal or what he wants from it (although a voluntary project of his could be involved to some extent in determining how or when the process occurs).

6. οἷον τὴν τῆς καρδίας τε καὶ τὴν τοῦ αἰδοίου. These same examples are given in *DA* III.9 (432^b29 ff.). See discussion of these lines *supra*.

The movement of the heart in question here, given the *DA* parallel, is almost certainly not the regular *σφυγμός* (*Resp.* 479^b26 ff., 480^a2–4), but the *πήδησις*, described as a reaction to something fearful (479^b19 ff., and the *DA* passage), though see *PA* 669^a19 ff. connects it with human hopes. It is said to be occasioned by the pushing together of the warm in the heart because of a chilling.

8–9. οἷον ὕπνον . . . ὅσαι ἄλλαι τοιαῦται εἰσιν. Going to sleep is explained in *PA* 653^a10 ff. and *Somm.* 3 with reference to cooling in the area of the brain, which forces warmth downward. It is a result of the processes of digestion. Waking is analyzed at *Somm.* 458^a10 ff. On respiration, cf. especially *Resp.* 480^a16–17: ἡ δ' ἀναπνοὴ γίνεται ἀνταναστροφῇ τοῦ θερμοῦ ἐν ᾧ ἡ ἀρχὴ ἢ θρεπτικὴ.

11–18. ἀλλ' ἐπειδὴ ἀνάγκη . . . γίνονται. The phrase καὶ . . . γίνονται is the apodosis. It is clearest to place αἰτίαι . . . φυσικαί in parentheses, as does Torraca. The standard punctuation, which makes the ἀλλ' a continuation of the sentence beginning οὐθενός, would make it necessary for us, on our interpretation of that sentence, to take all this as concerning only the non-voluntary. But if we punctuate this as a new sentence, the question is left open. τῶν ῥηθέντων μορίων at line 17 indicates

that Aristotle is thinking of the involuntary. But φυσικὴν ἀλλοίωσιν (11–12) seems to describe the necessity of the natural vital processes that are examples of the non-voluntary. The distinction between external and internal heatings and chillings (14–16) seems to correspond to the distinction between the involuntary and the non-voluntary, since all the non-voluntary are continuous organic processes in the body. *Physics* VIII, in describing κινήσεις φυσικαί such as growth, decay, respiration, sleep, and waking, claims that their origin is in the environment and in the things the animal takes into itself from the environment (253^a15 ff., 259^b7 ff.). These two positions are not inconsistent: the ultimate origin of the heatings and chillings may be in the food that is taken in, but the heatings and chillings themselves are internally generated as part of an organic process.

The phrase αἱ παρὰ τὸν λόγον κινήσεις (16–17; cf. also 703^b37) in the apodosis is vague and unsatisfactory. It does not seem to point to either of our groups, since many of the so-called ἐκούσια are also without λόγος.

18–19. ὥσπερ εἴρηται πρότερον. Cf. 701^b19–23, and chapters 6–7 generally.

21–22. διὰ τὸ ὥσπερ ζῶν κεχωρισμένον ἐκάτερον εἶναι τῶν μορίων. On the heart, cf. *PA* 666^a20–22: ἐν γὰρ τοῖς ἐμβρύοις εὐθέως ἡ καρδία φαίνεται κινουμένη τῶν μορίων καθάπερ εἰ ζῶν, ὡς ἀρχὴ τῆς φύσεως τοῖς ἐναίμοις οὖσα, and 666^a16–17: ἡ δὲ καρδία, καθάπερ εἶπομεν καὶ πρότερον, οἷον ζῶν τι πέφυκεν ἐν τοῖς ἔχουσιν. On the genitals, cf. *Pl. Timaeus*, 91 b: διὸ δὲ τῶν μὲν ἀνδρῶν τὸ περὶ τὴν τῶν αἰδοίων φύσιν ἀπειδές τε καὶ αὐτοκρατές γεγονός, οἷον ζῶν ἀννήκοον τοῦ λόγου, πάντων δι' ἐπιθυμίας οἰστρώδεις ἐπιχειρεῖ κρατεῖν. αἱ δ' ἐν ταῖς γυναιξὶν αὐτῶν μητραὶ τε καὶ ὑστέραι λεγόμεναι διὰ τὰ αὐτὰ ταῦτα, ζῶν ἐπιθυμητικὸν ἐνὸν τῆς παιδοποιίας.

22–23. [τοῦτον δ' αἵτιον ὅτι ἔχουσιν ὑγρότητα ζωτικὴν.] ἀρχή is obviously a gloss. It may, as Farquharson suggests, have been meant originally to go along with ἐπεὶ πολλὰ δυνάμει ἐστίν, as the ambiguous translation of William suggests: “quum multa virtute est principium ipsius b ad b. . . .” Here κινήσεις, not

ἀρχή, should be supplied. Only Farquharson excises ἀρχή, but Forster, keeping it, translates, “the origin of movement in C goes to C,” evidently understanding Aristotle to be using ἀρχή derivatively of a motor impulse. This seems forced.

26–36. αἱ δὲ κινήσεις . . . ὡς ἀπ' ἀρχῆς. Still within the context of this discussion of involuntary motions, Aristotle shows how a sensory stimulus travels to the central ἀρχή and a motor stimulus travels out again to the limbs. That there is such a single ἀρχή he takes as already established. The κίνησις comes from some point into the central origin A. (The diagram is the same one used in chapter 9 and is reproduced in the translation there.) This, in consequence, undergoes change; since it is potentially many (see note on 702^a30), it changes in such a way as to send motor impulses to various different parts of the body. Aristotle does not seriously tackle the difficult question of determining how and in how many ways the ἀρχή must change in order to give the various complex motions he describes, but he at least seems to acknowledge that the simple picture of a single heating or chilling that will account for everything may be insufficient to explain the phenomena.

This description makes no explicit reference to the activities of the πνεῦμα, which, at least in its role as desire's analogue, is probably not involved centrally in these activities (cf. Essay 3). Thus, though, as a very general picture of the interrelationship between sensory and motor activities, it could fit with the voluntary motions as well, it seems to be aimed particularly at accounting for the others.

32. ἡ μὲν τοῦ B [ἀρχῆς]. This is obviously a gloss. Cf. *HSCP*, p. 158.

36–704^a2. ὅτι δὲ . . . τοσαύτην ἢ τοιαύτην. On the importance of the antecedent bodily state, cf. *DA* 403^a16 ff. Thus the creature's voluntary (in the *MA* sense) pursuits and the bodily state resulting from them can be seen to affect the likelihood of his responding to certain stimuli with so-called involuntary motions.

2–704^b3. περὶ μὲν οὖν . . . περὶ γενέσεως εἰπεῖν. On these cross-references, cf. Part I, chapter 1, and Essay 2.

BIBLIOGRAPHY

If more than one work by a given author is cited, chronological order is followed. Footnote references cite the author's name and a short title. In the case of very frequently-cited works, for which a particularly abbreviated title-citation is used in the notes, this abbreviation is given in parentheses here following the full title listing. Aristotle editions, translations, and commentaries are listed under the name of the editor or translator.

- Ackrill, John. "Aristotle's Definitions of *Psuchē*." *PAS* 73 (1972-73):119-34.
- Albertus Magnus. *De Motibus Animalium. Opera Omnia*. Ed. A. Borgnet. Vol. IX. Paris: 1890-99.
- . *De Principiis Motus Progressivi. Opera Omnia*. Vol. IX.
- Alexander Aphrodisiensis. *Praeter Commentaria Scripta Minora: De Anima Liber cum Mantissa*. Ed. I. Bruns. *Supplementum Aristotelicum*, II.i. Berlin: 1887.
- . *In Meteorologicorum Libros Commentaria*. Ed. M. Hayduck. *CAG* III.ii. Berlin: 1899.
- Allan, Donald J. "Aristotle's Account of the Origin of Moral Principles." *Proceedings of the 11th International Congress of Philosophy* XII: Brussels 1953, 120-27.
- . "The Practical Syllogism." *Autour d'Aristote*. Louvain: 1955.
- Ando, Takatura. *Aristotle's Theory of Practical Cognition*. The Hague: 1971.
- Anscombe, G. E. M. *Intention*. Oxford: 1958.
- . "Thought and Action in Aristotle." *New Essays on Plato and Aristotle*. Ed. R. Bambrough. London: 1965, 143-58.
- Arnim, H. von. *Die Entstehung der Gotteslehre des Aristoteles*. Vienna: 1931.
- Aubenque, P. Review of Torraca, *MA*. *REG* 73 (1960):298.
- Austin, J. L. "Agathon and Eudaimonia in the *Ethics* of Aristotle." *Aristotle*. Ed. J. M. E. Moravcsik. London: 1968.

BIBLIOGRAPHY

- Averroes. *Commentarium Magnum in Aristotelis De Anima libros*. Ed. F. S. Crawford. Cambridge, Mass.: 1953.
- Ayala, F. J. "Teleological Explanations in Evolutionary Biology." *PS* 37 (1970):1-15.
- Balme, David M. *Aristotle's Use of the Teleological Explanation*. Inaugural Lecture at Queen Mary College, London. June, 1965.
- , tr. and comm. *Aristotle's De Partibus Animalium I and De Generatione Animalium I*. Clarendon Aristotle Series. Oxford: 1972.
- Barnes, Jonathan. "Aristotle's Theory of Demonstration." *Phronesis* 14 (1969):123-52, and in Barnes I, 65-87.
- . "Aristotle's Concept of Mind." *PAS* 72 (1971-72): 101-14.
- , Schofield, M., Sorabji, R., eds. *Articles on Aristotle, I*. (Barnes I). London: 1975.
- Baumstark, Anton. *Aristoteles bei den Syrern vom v.-viii. Jahrhundert*. Leipzig: 1900.
- Beare, J. I. *Greek Theories of Elementary Cognition*. Oxford: 1908.
- Beckner, M. "Function and Teleology." *JHB* 2 (1969): 151 ff.
- Bekker, I., ed. *Aristoteles Graece. Aristotelis Opera*. Ed. Berlin Academy. I and II. Berlin: 1831.
- Black, Max. "How Do Pictures Represent?" *Art, Perception, and Reality*. Ed. M. Mandelbaum. Baltimore: 1970.
- Block, Irving. "The Order of Aristotle's Psychological Writings." *AJP* 82 (1961):50-77.
- Bonitz, H. Note on *sullogizesthai*. *ZOG* 17 (1866):792-3.
- . *Index Aristotelicus*. Berlin: 1870, repr. Graz: 1955.
- Boorse, Christopher. "Wright on Functions." *PR* 85 (1976): 70-86.
- Brandis, Christian August. *Handbuch der Geschichte der griechisch-römischen Philosophie*. Berlin: 1835-66.
- Browning, Robert. "An Unpublished Funeral Oration on Anna Comnena." *PCPS* 8 (1962):1-12.
- Buridan, Jean. *De Motu Animalium*. Ed. F. Scott and H. Shapiro. *Isis* 58 (1967):533-52.
- Burley, Walter. *De Motu Animalium*. Ed. F. Scott and H. Shapiro. *Traditio* 25 (1969):171-90.

BIBLIOGRAPHY

- Bywater, I., ed. *Aristotelis Ethica Nicomachea*. Oxford Classical Texts. Oxford: 1894.
- Canfield, John. "Teleological Explanations in Biology." *BJPS* 14 (1964):285-295.
- Capelle, W. "Das Proömium der Meteorologie." *Hermes* 47 (1912):514-35.
- Carteron, Henri. *La notion de force dans le système d'Aristote*. Paris: 1923.
- Chantraine, P. *Dictionnaire étymologique de la langue grecque*. Paris: 1968-.
- Charlton, W., tr. and comm. *Aristotle's Physics I, II*. Clarendon Aristotle Series. Oxford: 1970.
- Cherniss, Harold. *Aristotle's Criticism of Plato and the Academy*. Baltimore: 1944.
- Clark, Stephen R. L. *Aristotle's Man*. Oxford: 1975.
- Cooper, John. *Reason and Human Good in Aristotle*. Cambridge, Mass.: 1975.
- Cummins, Robert. "Functional Analysis." *JPhilos* 72 (1975): 741-64.
- Davidson, Donald. "Actions, Reasons, and Causes." *The Philosophy of Action*. Ed. Alan White. Oxford: 1968.
- Dennett, D. C. *Content and Consciousness*. London: 1969.
- . "Mechanism and Responsibility." *Essays on Freedom of Action*. Ed. T. Honderich. London: 1973.
- Diels, Hermann. *Doxographi Graeci*. Berlin: 1879.
- , Kranz, W., eds. *Fragmente der Vorsokratiker*. 14th edition. Dublin/Zurich: 1969.
- Dodds, E. R., ed. *Plato: Gorgias*. Oxford: 1959.
- Düring, Ingemar, ed. *Aristotle's De Partibus Animalium*. Göteborg: 1943.
- . "Aristotle the Scholar." *Commentationes in honorem E. Linkomies. Arctos* NS 1 (1954):61-77.
- . "Ariston or Hermippus?" *CI Med* 17 (1956):11-21.
- . "Aristotele, *De Motu Animalium*, a cura di Luigi Torraca." *Gnomon* 31 (1959):415-18.
- . "Aristotle's Method in Biology." *Aristote et les problèmes de méthode*. Symposium Aristotelicum 2 (1960). Louvain: 1961, 213-24.

BIBLIOGRAPHY

- . *Aristoteles*. Heidelberg: 1966.
- . "Aristoteles." *RE* Suppl. 11 (1968):159–336.
- Etheridge, Sanford G. "Aristotle's Practical Syllogism and Necessity." *Philologus* 112 (1968):20–42.
- Eucken, Rudolf. *Über den Sprachgebrauch des Aristoteles. Beobachtungen über die Praepositionen*. Berlin: 1868.
- Farquharson, A. S. L., tr. *Aristotle's De Motu Animalium*. The Oxford Translation of Aristotle, V. Oxford: 1912.
- Forster, E. S., tr. *Aristotle, Movement of Animals, Progression of Animals*. Loeb Classical Library. Cambridge, Mass.: 1937.
- Freudenthal, J. *Über den Begriff des Wortes phantasia bei Aristoteles*. Göttingen: 1869.
- Furley, David J. *Two Studies in the Greek Atomists*. Princeton: 1967.
- . "Self Movers." Symposium Aristotelicum 7 (1975), forthcoming, ed. G. E. L. Owen and G. E. R. Lloyd.
- Galen, *De Usu Partium. Corpus Medicorum Graecorum*. Ed. C. G. Kühn. III. Leipzig:1821–33.
- Gauthier, René Antoine, and Jolif, Jean Yves, tr. and comm. *Aristote, L'Éthique à Nicomaque*. Second Edition. Louvain/Paris: 1970.
- Goodman, Nelson. *The Structure of Appearance*. New York: 1966.
- . *Languages of Art. (LA)* Indianapolis: 1968.
- . "Seven Strictures on Similarity." *Problems and Projects*. New York: 1972.
- Grabmann, Martin. *Guglielmo di Moerbeke, O. P., il traduttore delle opere di Aristotele*. *Miscellanea Historiae Pontificiae* 11. Rome: 1946.
- Grant, Sir Alexander. *The Ethics of Aristotle illustrated with Essays and Notes*. London: 1885, repr. New York, 1973.
- Greenwood, L.H.G., comm. *Aristotle, Nicomachean Ethics, Book VI*. Cambridge: 1909, repr. New York: 1973.
- Guthrie, W. K. C. "The Development of Aristotle's Theology." *CQ* 27 (1933):162–71.
- , tr. *Aristotle, De Caelo*. Loeb Classical Library. Cambridge, Mass.: 1939.

BIBLIOGRAPHY

- Hamlyn, D. W., tr. and comm. *Aristotle's De Anima*. Clarendon Aristotle Series. Oxford: 1968.
- Hardie, R. P. and Gaye, R. K., tr. *Aristotle: Physics*. The Oxford Translation of Aristotle, II. Oxford: 1930.
- Hardie, W. F. R. "Aristotle's Treatment of the Relation between the Soul and the Body." *PQ* 14 (1964):53–72.
- . *Aristotle's Ethical Theory. (AET)* Oxford: 1968.
- Heath, T. L. *Aristarchus of Samos: a History of Greek Astronomy to Aristarchus*. Oxford: 1913, repr. 1959.
- Heitz, E. *Die verlorenen Schriften des Aristoteles*. Leipzig: 1865.
- Hempel, C. G. "The Logic of Functional Analysis." *Aspects of Scientific Explanation*. New York: 1965.
- Heron Alexandrinus. *Opera*. Ed. W. Schmidt. Bibliotheca Teubneriana. Leipzig: 1899–1914.
- Hicks, R. D., ed., tr., and comm. *Aristotle, De Anima*. Cambridge: 1907.
- Hintikka, Jaako. "Aristotle on the Realization of Possibilities in Time." *Time and Necessity*. Oxford: 1973.
- . "Practical vs. Theoretical Reason—an Ambiguous Legacy." *Practical Reason*. Ed. S. Körner. Oxford: 1974.
- Hippocrates. *On Ancient Medicine*. Ed. W. H. S. Jones. Loeb Classical Library. Cambridge, Mass.: 1962.
- Ideler, I. L., ed. *Aristotelis Meteorologicorum Libri IV*. Bibliotheca Teubneriana. Leipzig: 1836.
- Irigoin, J. "L'Aristote de Vienne." *JOBG* 6 (1957):5–10.
- Irwin, T. H., "Recollection and Plato's Moral Theory." *RM* 27 (1974):752–72.
- . "Aristotle on Reason, Desire, and Virtue." *JPhilos* 72 (1975):567–78.
- Ishiguro, Hidé. "Imagination." *British Analytical Philosophy*. Ed. B. A. O. Williams and A. Montefiore. London: 1966.
- Jaeger, Werner. "Das Pneuma im Lykeion." *Hermes* 48 (1913):31–70.
- , ed. *Aristotelis De Animalium Motione, De Animalium Incessu, De Spiritu*. Bibliotheca Teubneriana. Leipzig: 1913.
- , ed. *Aristotelis Metaphysica*. Oxford Classical Texts. Oxford: 1957.

BIBLIOGRAPHY

- Joachim, H. H., ed. and comm. *Aristotle On Coming-to-be and Passing-Away*. Oxford: 1922, repr. Hildesheim: 1970.
- , comm. *The Nicomachean Ethics*. Oxford: 1951.
- Kahn, Charles. "Sensation and Consciousness in Aristotle's Psychology." *AGP* 48 (1966): 34–81.
- Keaney, John J. "Two Notes on the Tradition of Aristotle's Writings." *AJP* 84 (1963): 52–63.
- Kenny, Anthony. "The Practical Syllogism and Incontinence." *Phronesis* 11 (1966): 163–84.
- Kerferd, George. Review of Reiche, q.v. *CR* 96 (1962): 93–4.
- Kim, Jaegwon. "Intention and Practical Inference." *Essays on Explanation and Understanding*. Ed. Juha Manninen and Raimo Tuomela. Dordrecht: 1976.
- Kolakowski, Leszek. "In Praise of Inconsistency." *Towards a Marxist Humanism*. New York: 1968.
- Kosman, Aryeh. "Explanation and Understanding in Aristotle's *Posterior Analytics*." *Exegesis and Argument*. Ed. E. N. Lee, A. P. D. Mourclatos, R. M. Rorty. Assen: 1973.
- Lambros, S., ed. *De Natura Animalium. Supplementum Aristotelicum*, I.i. Berlin: 1885.
- Lee, H.D.P., tr. *Meteorologica*. Loeb Classical Library. Cambridge, Mass.: 1952.
- Leonicus, Nicolaus, tr. *De Motu Animalium. Aristotelis Opera*. Ed. Berlin Academy. III (1831): 342^a–45^b.
- Leshner, James. "The Role of *Nous* in Aristotle's *Posterior Analytics*." *Phronesis* 18 (1973): 44–68.
- Lesky, Erna. *Die Zeugungs- und Vererbungslehren der Antike und ihr Nachwirken*. AbhMainz: 1950.
- Littig, Friedrich. *Andronikos von Rhodos*. I. Munich: 1890.
- Littré, E., *Oeuvres complètes d'Hippocrate*. 10 vols. Paris: 1839–61.
- Louis, Pierre. "Le traité d'Aristote sur la nutrition." *RPh* 26 (1952): 29–35.
- , ed. and tr. *Aristote: Marche des animaux, Mouvement des Animaux*. Budé Series. Paris: 1973.
- Lycos, K. "Aristotle and Plato on 'Appearing'." *Mind* 73 (1964): 496–514.

BIBLIOGRAPHY

- Mackie, J. L. *The Cement of the Universe*. Oxford: 1974.
- . Comments on J. Hintikka, q.v. *Practical Reason*. Ed. S. Körner. Oxford: 1974.
- Malcolm, Norman. "Intention and Behavior." *The Philosophy of G. H. von Wright*. The Library of Living Philosophers, ed. Paul Arthur Schilpp. Forthcoming.
- Mansion, Augustin. *Introduction à la physique aristotélécienne*. 2nd edition. Louvain: 1946.
- Maritain, Jacques. *The Rights of Man and Natural Law*. New York: 1943.
- Mayr, E. "Cause and Effect in Biology." *Cause and Effect*. Ed. D. Lerner. New York: 1965.
- Melden, A. *Free Action*. London: 1961.
- Merlan, P. *Platonism to Neoplatonism*. The Hague: 1953.
- Michael Ephesius. In *Libros De Partibus Animalium, De Animalium Motione, De Animalium Incessu Commentaria*. Ed. M. Hayduck. CAG XXII.ii. Berlin: 1904.
- Milo, Ronald D. *Aristotle on Practical Knowledge and Weakness of Will*. The Hague: 1966.
- Morau, Paul. *Les listes anciennes des ouvrages d'Aristote*. Louvain: 1951.
- . "Aristotele *De Motu Animalium* a cura di Luigi Torraca." *AntCl* 28 (1959): 363–66.
- . "Quinta Essentia." *RE* 47 (1963): 1171–1263.
- , ed. and tr. *Aristote, Du Ciel*. Budé Series. Paris: 1965.
- . *Der Aristotelismus bei den Griechen*, I. Berlin: 1973.
- Mothersill, Mary. "Anscombe's Account of the Practical Syllogism." *PR* 71 (1962): 448–61.
- Müller, August. "Das arabische Verzeichnis der aristotelischen Schriften." *Morgenländische Forschungen*. Leipzig: 1875.
- Nagel, Ernest. *The Structure of Science*. New York: 1961.
- Nagel, Thomas. "Physicalism." *PR* 74 (1965): 339–56. Reprinted in *Modern Materialism*. Ed. J. O'Connor. New York: 1969.
- Nietzsche, Friedrich. *The Birth of Tragedy*. (BT) Tr. W. Kaufmann. New York: 1967.

BIBLIOGRAPHY

- Nussbaum, Martha. Review of P. Louis' *MA*. *JHS* 95 (1975): 207–208.
- . "The Text of Aristotle's *De Motu Animalium*." *HSCP* 80 (1976): 111–59.
- . *Aristotle's De Motu Animalium*. Ph.D. dissertation, Harvard University: 1975.
- Nuyens, F. *L'évolution de la psychologie d'Aristote*. Tr. A. Mansion. Louvain: 1948.
- Ostwald, Martin, tr. *Nicomachean Ethics*. Indianapolis/New York: 1962.
- Owen, G. E. L. "Logic and Metaphysics in some Earlier Works of Aristotle," *Aristotle and Plato in The Mid-Fourth Century*. Ed. I. Düring and G. E. L. Owen. Göteborg: 1960.
- . "Tithenai ta phainomena." *Aristote et les problèmes de méthode*. Symposium Aristotelicum 2 (1960). Louvain: 1961, 83–103. Repr. in *Aristotle*, ed. J. M. E. Moravcsik. London: 1968, 166–90; and in Barnes I.
- . Commentary on papers by van der Waerden and Sambursky. *Scientific Change*. Ed. A. C. Crombie. London: 1963.
- . "The Platonism of Aristotle." *PBA* 51 (1965): 125–50. Repr. in *Studies in the Philosophy of Thought and Action*. Ed. P. F. Strawson. Oxford: 1968; and in Barnes I.
- . "Dialectic and Eristic in the Treatment of the Forms." *Aristotle on Dialectic: the Topics*. Symposium Aristotelicum 3. Oxford: 1968, 103–25.
- . Aristotle: method, physics, and cosmology." *Dictionary of Scientific Biography*. Ed. C. C. Gillispie. New York: 1970. I, 250–58.
- Owens, Joseph. "Teleology of Nature in Aristotle." *Monist* 52 (1968): 159–73.
- Peck, A. L., tr. *Aristotle, Parts of Animals*. Loeb Classical Library. Cambridge, Mass.: 1937.
- , tr. *Aristotle, Generation of Animals*. Loeb Classical Library. Cambridge, Mass.: 1942.
- . "The connate *pneuma*, an essential factor in Aristotle's solutions to the problems of reproduction and sensation."

BIBLIOGRAPHY

- Science, medicine, and history: essays on the evolution of scientific thought and medical practice, written in honour of Charles Singer*, I. Ed. E. A. Underwood. Oxford: 1953.
- , tr. *Aristotle, Historia Animalium*. Loeb Classical Library. Cambridge, Mass.: 1965, 1970.
- Peters, F. E. *Aristoteles Arabus*. Leiden: 1968.
- Philoponus, John. In *Aristotelis Physicorum Libros Tres Priores Commentaria*. Ed. H. Vitelli. *CAG* XVI. Berlin: 1887.
- . In *Aristotelis de Anima Libros Commentaria*. Ed. M. Hayduck. *CAG* XV. Berlin: 1887.
- . In *Aristotelis Meteorologicorum Librum Primum Commentarium*. Ed. M. Hayduck. *CAG* XIV.i. Berlin: 1901.
- Place, U. T. "Is Consciousness a Brain Process?" *BJP* 47 (1956). Repr. in *Modern Materialism*. Ed. J. O'Connor. New York: 1969.
- Plato. *Opera*, I–V. Ed. J. Burnet. Oxford Classical Texts. Oxford: 1902.
- Platt, A. "Notes on Aristotle." *JPhilol* 32 (1912–13): 274–99.
- Plezia, Marián. *De Andronici Rhodii Studiis Aristotelicis*. Polska Akademia Umiejętności, Archiwum filologiczne, 20. Krakow: 1946.
- Poppelreuter, H. *Zur Psychologie des Aristoteles, Theophrast, Strato*. Dissertation, Erlangen. Leipzig: 1892.
- Preus, Anthony. "Science and Philosophy in Aristotle's *de Generatione Animalium*." *JHB* 3 (1970): 1–52.
- Price, H. H. "Imageless Thinking." *PAS* 52 (1951–52): 135–66.
- Prichard, H. A. "The Meaning of *Agathon* in the *Ethics* of Aristotle." *Aristotle*. Ed. J. M. E. Moravcsik. London: 1968.
- Putnam, Hilary. "Philosophy and our Mental Life." *Philosophical Papers*, II. Cambridge: 1975.
- . "Literature, Science, and Reflection." *New Literary History* 7 (1975–76): 483–91.
- Rawls, John. "Outline of a Decision Procedure for Ethics." *PR* 60 (1951): 177–97.
- . "Two Concepts of Rules." *PR* 64 (1955): 3–32.

BIBLIOGRAPHY

- . *A Theory of Justice*. Cambridge, Mass.: 1971.
- Rees, D. A. "Aristotle's Treatment of *Phantasia*." *Essays in Ancient Greek Philosophy*. Ed. J. P. Anton and G. L. Kustas. Albany: 1971.
- Reiche, H. A. T. *Empedocles' Mixture, Eudoxan Astronomy, and Aristotle's Connate Pneuma*. Amsterdam: 1960.
- Rodier, G., ed., tr., and comm. *Aristote, Traité de l'âme*. Paris: 1900.
- Rolfes, E., tr. *Aristoteles: Kleine naturwissenschaftliche Schriften*. Leipzig: 1924.
- Rose, Valentin. *De Aristotelis Librorum Ordine et Auctoritate*. Berlin: 1854.
- Ross, W. D. *Aristotle*. London: 1923.
- , ed. and comm. *Aristotle's Metaphysics*. Oxford: 1924.
- , tr. *Ethica Nicomachea*. The Oxford Translation of Aristotle. IX, 1. Oxford: 1925.
- , ed. and comm. *Aristotle's Physics*. Oxford: 1936.
- , ed. and comm. *Aristotle's Prior and Posterior Analytics*. Oxford: 1949.
- , ed. and comm. *Aristotle, Parva Naturalia*. Oxford: 1955.
- . "The Development of Aristotle's Thought." *PBA* 43 (1957):63-78. Repr. in *Barnes I*, 1-13.
- , ed. and comm. *Aristotle, De Anima*. Oxford: 1961.
- Rüsché, F. *Blut, Leben, und Seele*. Paderborn: 1930.
- Ruse, Michael. "Functional Statements in Biology." *PS* 38 (1971):87-95.
- Ryle, Gilbert. *The Concept of Mind*. London: 1949.
- Santas, Gerasimos. "Aristotle on practical inference, the explanation of action, and akrasia." *Phronesis* 14 (1959):162-89.
- Sartre, Jean-Paul. *L'Imaginaire*. Paris: 1948.
- Scheffler, Israel. "Thoughts on Teleology." *BJPS* 9 (1958-59): 265-84.
- Scherling, K. "Tityos." *RE* 12 A, 1593-1609.
- Sellars, W. "Substance and Form in Aristotle." *JPhilos* 54 (1957):688-99.
- . "Raw Materials, Subjects, and Substrata." *Philosophical Perspectives*. Springfield, Ill.: 1967: 137-52.

BIBLIOGRAPHY

- Shorter, J. M. "Imagination." *Mind* 61 (1952):528-42.
- Sidgwick, Henry. *The Methods of Ethics*. Seventh Edition. London: 1907, repr. New York: 1966.
- Simplicius. In *Aristotelis Physicorum Libros Quattuor Priores Commentaria*. Ed. H. Diels. CAG IX. Berlin: 1882.
- . In *Libros Aristotelis de Anima Commentaria*. Ed. M. Hayduck. CAG XI. Berlin: 1882.
- . In *Aristotelis De Caelo Commentaria*. Ed. I. L. Heiberg. CAG VII. Berlin: 1893.
- Siwek, Paul. *La psychophysique humaine d'après Aristote*. Paris: 1930.
- Skemp, J. *The Theory of Motion in Plato's Later Dialogues*. Amsterdam: 1967.
- Skinner, B. F. *Beyond Freedom and Dignity*. New York: 1971.
- Slakey, Thomas. "Aristotle on Sense-Perception." *PR* 70 (1961):470-84.
- Solmsen, Friedrich. "The vital heat, the inborn *pneuma* and the aether." *JHS* 77 (1957):119-23.
- . *Aristotle's System of the Physical World*. Ithaca, N.Y.: 1960.
- . "Greek Philosophy and the Discovery of the Nerves." *MusHelv* 18 (1961):150-67, 187-97.
- . Review of Reiche, q.v. *AJP* 84 (1963):91-94.
- Sorabji, R. R. K. "Functions." *PQ* 14 (1964):289-302.
- . *Aristotle on Memory*. Providence, R.I.: 1972.
- . "Body and Soul in Aristotle." *Philosophy* 49 (1974): 63-89.
- Speusippus. *Fragmenta*. Ed. P. Lang. Bonn: 1911, repr. Hildesheim: 1964.
- Steinschneider, Moritz. "Ptolemaei Philosophi Index Librorum Aristotelis ex Arabico Translatus." *Aristotelis Opera*. Ed. Berlin Academy V. Berlin: 1870.
- . "Die *Parva Naturalia* des Aristoteles bei den Arabern." *ZDMG* 37 (1883):486 ff.
- Stewart, J. A., comm. *Notes on the Nicomachean Ethics of Aristotle*. Oxford: 1892, repr. New York: 1973.
- Strawson, P. F. *Individuals*. London: 1959.

BIBLIOGRAPHY

- Taylor, Charles. *The Explanation of Behaviour*. New York: 1964.
- . "Teleological Explanation—a Reply to Denis Noble." *Analysis* 27 (1966–67):141–43.
- . "Mind-Body Identity: a Side-Issue?" *PR* 76 (1967): 201–18.
- . "The Explanation of Purposive Behaviour." *Explanation in the Behavioural Sciences*. Ed. R. Borger and F. Cioffi. Cambridge: 1970.
- . "Conditions for a Mechanistic Theory for Behaviour." *Brain and Human Behaviour*. Ed. A. G. Karczma and J. C. Eccles. Berlin: 1972.
- Themistius. In *Libros Aristotelis De Anima Paraphrasis*. Ed. R. Heinze. *CAG* V.iii. Berlin: 1899.
- . In *Libros Aristotelis De Caelo Paraphrasis*. Ed. S. Lander. *CAG* V.iv. Berlin: 1902.
- Thielscher, P. "Die relative Chronologie der erhaltenen Schriften des Aristoteles nach den bestimmten Selbstzitaten." *Philologus* 97 (1948):229–65.
- Torraca, Luigi. "Sull' autenticità del *De Motu Animalium* di Aristotele." *Maia* 10 (1958):220–33.
- , ed. and tr. *Aristotele, De Motu Animalium*. Naples: 1959.
- Urmson, J. "Aristotle's Doctrine of the Mean." *APQ* 10 (1973):223–30.
- Verdenius, W. J. "Traditional and Personal Elements in Aristotle's Religion." *Phronesis* 5 (1960):56–70.
- Wachsmuth, R. *De Aristotelis Studiis Homericis*. Dissertation, Berlin: 1863.
- Walsh, James. *Aristotle's Conception of Moral Weakness*. New York: 1963.
- Walton, Kendall. "Are Representations Symbols?" *Monist* 58 (1974):236–54.
- Walzer, M. "Political Action: the Problem of Dirty Hands." *PPA* 2 (1973):160–80. Repr. in *War and Moral Responsibility*. Ed. M. Cohen, T. Nagel, and T. Scanlon. Princeton: 1974.
- Wartelle, André. *Inventaire des manuscrits grecs d'Aristote et de ses commentateurs*. Paris: 1963.

BIBLIOGRAPHY

- Webster, E. W., tr. *Meteorologica*. The Oxford Translation of Aristotle. III. Oxford: 1931.
- Wehrli, Fritz, ed. *Die Schule des Aristoteles*. 10 vols. Basel: 1944–59.
- Wenrich, J. G. *De Auctorum graecorum versionibus et commentariis syriacis arabicis armeniacis persicisque commentatio*. Leipzig: 1842.
- Wernicke, K. "Atlas." *RE* 4, 2118–33.
- . "Boreas." *RE* 5, 720–30.
- White, Nicholas P. "Aristotle on Sameness and Oneness." *PR* 80 (1971):177–97.
- Wieland, Wolfgang. "The Problem of Teleology." Barnes I, 141–60. Originally "Zum Teleologieproblem," chapter 16 of *Die aristotelische Physik*. Göttingen: 1962, 2nd edition 1970.
- Wiersma, W. "Die aristotelische Lehre vom Pneuma." *Mnemosyne* 11 (1943):102–7.
- . Review of Reiche, q.v. *Mnemosyne* 15 (1962):52–53.
- Wiggins, David. *Identity and Spatio-Temporal Continuity*. Oxford: 1967.
- . "Identity, Designation, Essentialism, and Physicalism." *Philosophia* 5 (1975):1–30.
- . "Deliberation and Practical Reason." *PAS* 76 (1975–76).
- . "Locke, Butler, and the Stream of Consciousness: and Men as a Natural Kind." *Philosophy* 51 (1976):131–56.
- Williams, B. A. O. "Aristotle on the Good: a Formal Sketch." *PQ* 12 (1962):289–96.
- . "Ethical Consistency." *PASS* 39 (1965). Repr. in *Problems of the Self*. Cambridge: 1973.
- . "Consistency and Realism." *PASS* 40 (1966). Repr. in *Problems of the Self*. Cambridge: 1973.
- Williams, C. J. F. "Aristotle and Corruptibility." *Religious Studies* I (1965):95–107, 203–15.
- Wilson, J. Cook. "Difficulties in the Text of Aristotle." *JPhilol* 32 (1912–13): 137–65.
- Wittgenstein, Ludwig. *Philosophical Investigations*. Oxford: 1953.

BIBLIOGRAPHY

- . *The Blue and Brown Books*. Oxford: 1958.
- . *Lectures and Conversations on Aesthetics, Psychology, and Religious Belief*. Berkeley: 1972.
- Wollheim, Richard. "Nelson Goodman's *Languages of Art*." *On Art and the Mind*. London: 1973.
- Wright, G. H. von. "Practical Inference." ("PI"). *PR* 72 (1963):154-79.
- . *The Varieties of Goodness*. (VG). London: 1963.
- . *Explanation and Understanding*. (EU). London: 1971.
- Wright, Larry. "Functions." *PR* 82 (1973):139-68.
- Zeller, Eduard. *Die Philosophie der Griechen in ihrer geschichtlichen Entwicklung dargestellt*. 3 vols. in 5. Leipzig: 1876-89.

INDEX

- action, xx, 40, 91, 165-220, 333, 342-43; conclusion of practical syllogism, 40, 185-86; intentional, 60, 85-88; *phantasia* in the accounts of, xxii, 221, 232-41, 250, 261-68. *See also* explanation; motion; practical syllogism
- active and passive, 44, 121, 144-45, 290-91, 296, 322, 357-58
- affections (*pathē*), 46, 54, 144-45, 154, 296, 353-54
- air, 123, 158-62, 316
- aithēr*, 32, 159-62, 316-17
- akrasia*, 105, 201, 203-204, 207, 212, 218, 346
- alteration (*alloiōsis*), 36, 42, 52, 54, 91, 151, 156-57, 161-62, 233, 257, 325-30, 339-40, 347, 350-51, 353, 357-58
- anankastic practical reasoning, 176-210
- animals, xvii-xx; division of moving and moved parts in, 118-23; "incomplete," 234-36; non-human, 101, 192, 262-65, 335, 341-42, 380; parts of, 54, 273, 322, 356-57; self-maintaining in, 76-80; self-motion of, 322-24, 331-32; species of, 66, 275; unity as organisms, 78-79, 280, 358-61, 364-68, 372. *See also* explanation; motion
- anticipation, 44, 355-56
- appearances (*phainomena*), xvi-xvii, 62, 67, 96-99, 104-106, 109, 112-13, 116, 133-38, 174, 187, 231, 246, 275, 279
- appearing (*phainesthai*), 222-23, 231, 241-55
- appetite (*epithumia*), 38, 194, 234, 237, 333-36, 345-46
- arm and hand, 26, 46-48, 285, 362, 364
- artifacts, 63, 69-70, 74, 81, 93, 101, 121-22
- astronomy, *see* cosmology
- atoms, 63-64, 66
- authenticity of the *MA*, xxiii, 3-12, 378
- belief, 86-87, 175-210, 245, 342
- biological works of Aristotle, 12, 13, 108, 114, 287, 351
- biology, 109-42
- body, 44, 144, 311, 317; no infinite, 32, 131, 306, 312, 317-18. *See also* explanation; form and matter; physiology
- bones, 42, 276, 349
- cart example, 42, 144, 347, 350
- change (*kinēsis*), types of in Aristotle, 20-21, 325-30. *See also* motion
- character, 196
- choice (*prohairesis*), 38, 185, 336-37
- city simile, 3, 7-8, 52, 145, 149-50, 152-53, 161, 360, 374, 378-79
- cognition, 155, 185-210, 223, 232, 235, 276, 333, 337, 341, 358-60
- cosmology, xx, xxii, 108-42, 163-64, 283, 298-99. *See also* heavenly spheres; heavens; unmoved mover

INDEX

- cross-references in works of Aristotle, 9-12
- dating of *MA*, 3-12, 361
- decaying-sense theory, 222-23, 244, 248, 255, 260. *See also* memory; *phantasia*
- deliberation, 103-106, 165-66, 168-70, 172-74, 181-84, 190, 197, 206-207, 263-65, 343
- desire (*orexis*) xviii, 9, 38-42, 50, 52, 65, 73, 86-89, 91, 93, 115, 132, 143-46, 150-57, 160, 163, 167-68, 175-210, 221-22, 232-33, 236, 261-65, 269, 276-78, 331, 333-34, 337, 345-47, 379, 382-33; object of, 86, 120-21, 341, 380; species of, 334-36
- dialectic, 40, 65, 131, 345
- differentiae (*diaphorai*), 274-75
- dreaming, 221-22, 244, 247, 249, 268
- earth, 30, 32, 34, 93, 123, 126-38, 158, 162, 287, 294, 299, 305, 306-10, 314, 316-17
- elements, 96, 108, 146, 158-59, 311-12, 318, 322-23. *See also* lifeless things
- entelechy, 72, 149
- epistēmē*, xv, 109, 111, 215
- experience, xvi-xvii
- explanation, xv-xxiii, 59-106, 143-64, 165-220, 221-69; formal, 60-74; functional, xxi, 70, 74-75, 77, 80, 81-85, 92, 100-106, 146; "general" or "common," xx, 24, 114, 116, 142, 273, 275-78; material, 60-74, 92-93, 114-15, 322; mathematical models in, 283-84; teleological, xx-xxi, 59-99, 114-15, 132-42, 146, 156, 174-210, 277, 304, 322, 331, 333, 372
- fear, 42, 350, 352, 355, 382
- final cause, *see* explanation, teleological
- fire, 32, 34, 79, 93, 158-60, 162, 315-17
- force, 30, 128, 130-31, 139-41, 306-10, 311-18, 321
- form and matter, 60-74, 146-49
- for-the-sake-of-which, *see* explanation; goal
- function, *see* explanation, functional
- generation, 36, 54, 325-30, 379
- goal, xviii, 38, 42, 58, 63, 65, 74, 78, 85-86, 93, 115, 120, 175-210, 232, 277-78, 331-33, 336-37, 380, 382
- god, 134-38
- good, 97, 277, 336; apparent, 38, 245, 338; as goal of motion, 38; and major premise of practical syllogism, 40, 189-90; unmoved mover as first, 339. *See also* desire; explanation
- growth, 36, 52, 61, 67, 78-80, 97, 101, 119, 325-30, 380, 384
- heart, 7, 44, 50, 52, 144-46, 152-53, 156-57, 274, 278, 350-52, 358-61, 368-73, 377
- heat and cold, 44, 54, 65, 144-45, 154-57, 233, 350-55, 357, 384
- heavenly spheres, 73, 77, 93, 120-21, 125-42, 159, 163, 297, 301, 311, 323, 332, 339
- heavens, 28-36, 66, 97, 120-42, 292, 295, 298-99, 300, 307-10, 311-23

INDEX

- human beings, 95-96, 100-106, 211, 262-63, 341, 371
- hylomorphism, *see* form and matter; explanation; soul
- images, mental, 222-30, 241-55
- imagination, xxii; and Aristotle's *phantasia*, 221-69, 355-56; empiricist theories of, xxii, 223-30
- impossibility, 32, 312-14, 321
- infinite, 131, 312. *See also* body; force
- interpretation and cognitive activity, 137-38, 210, 227-28, 230, 248, 259-61, 268-69
- joints, 24, 46, 50, 121-23, 145, 157, 273, 276-77, 279-82, 284-86, 322, 357, 360-68
- justice, 211-14, 217
- justification, 103-106, 111-12, 167-69, 207, 219-20
- kritikon*, translation of, 334. *See also* cognition
- kulindroi*, 42, 348
- leg, 26
- lifeless things, 34, 36, 60, 66, 89, 93-96, 300, 322-24, 331, 364
- lists of Aristotle's works, 4-5, 12
- manuscripts, 13-17
- mathematical entities, 129-30, 282-84, 295-99
- mathematical examples, 24-26, 273, 276, 281-84, 295-99, 305, 369-70
- matter, Aristotle's theory of, 158-64
- medium for motion, 123-25, 286-91
- memory, 44, 54, 221-22, 244, 247, 249, 268, 355-56
- methodology, 6, 8, 107-42, 163-64
- moon, 32, 313-16
- motion (*kinēsis*), alteration and growth contrasted with local, 20-21, 36, 274, 325-30, 339-40; animal and heavenly, 28-34, 38-40, 120-42, 163-64, 286-88, 292, 331; contact and, 294; eternal, 24, 36, 116-17, 125, 132, 332; involuntary, 52, 54, 379-85; kinds of local, 24, 278-79; of mathematics, 282-84; natural, 119, 126, 129, 132, 158-64, 302, 305-306, 316-17, 377; non-voluntary, 52, 54, 119, 379-85; no infinite, 32; origin of, 24-25, 32, 36, 44, 46, 48, 54, 118-23, 280, 284, 358-61, 364-68, 369-73, 377, 379, 385; rational and non-rational, 380; requires something at rest, 25, 29-36, 118-25, 273, 281, 284, 286-92, 304, 311, 322; self-, 11, 24, 34, 114, 117-42, 233, 240, 277-80, 311, 316, 322-23, 332; simple and complex, 295-99; of universe, xx, 28-36, 286; voluntary, 52, 379-85
- myth of Atlas, 30, 127-38, 140, 300-304
- natural motion, *see* motion, natural
- natural place, *see* place, natural
- nature, 63, 66, 95-97, 356. *See also* teleology
- necessity, 32, 65-66, 74, 78, 88-93, 175-84, 185, 202, 204-205, 313-16, 319; hypothetical, 88-

INDEX

- necessity (*cont.*)
 93, 115, 177-78, 193; logical
 and physical, 313-14
- penis, 52, 54, 383-84
- peri trophēs*, 375-77
- phantasia*, xxii, 20-21, 38, 42, 44,
 52, 54, 86-87, 98, 144-45, 151-
 52, 154, 174, 194, 221-69, 278,
 322, 333, 340-41, 353, 380, 382
- physiology, 11, 59, 91-92, 143,
 146, 148, 152-63, 237-38, 249,
 256-57, 258-65, 276, 281-84,
 341, 353, 357, 369-71, 373, 383
- place, natural, 94, 131, 134,
 158-59, 305-306, 312
- plants, 61, 76-80, 94-95, 101,
 106-107, 133, 236
- pleasant (*hēdu*), 38, 42, 44, 170,
 237, 245, 257, 259, 336, 338
- plenitude, principle of, 313-16,
 321
- pneuma*, *sumphuton*, xxii, 6-7,
 12, 20-21, 50, 52, 113, 143-64,
 274, 336, 350, 362, 374-78, 379
- poets, 300-304
- points, 122, 126, 128-30, 295-99
- poles, 28-29, 126-27, 293-99,
 302-303
- possible, and minor premise of
 practical syllogism, 40, 189-90,
 193, 195
- potential and actual, 48-50, 70,
 281, 357, 361, 363-64, 385
- practical conflict, 165-75, 216-19
- practical reasoning, 100, 102-
 106, 165-220, 266, 337, 342-43,
 379
- practical syllogism, 40, 42, 66,
 87, 151, 157, 165-220; con-
 clusion of, 40, 185-88, 194-95,
 202-205, 342-44; examples of,
 40, 42, 189-98, 207, 240, 342-
 46; premises of, 40, 189-90,
 193, 195-98, 201-205, 233, 262,
 264-65, 331, 341-46; transla-
 tion of *sullogismos*, 183-84
- practical wisdom, 171-72, 211-
 12, 215-16, 220
- primum mobile*, *see* heavenly
 spheres; heavens
- principles, first, 110-13, 164,
 166-68, 174, 200, 210
- psychology, 143-64; of *MA* and
 other works, 3, 7-8, 11, 143-
 64, 231; and physiology, 11
- puppet example, 42, 65, 144,
 155-56, 188, 347, 349, 358
- reasoning (*dianoia*), 38, 40, 277,
 336
- reasoning, practical, *see* prac-
 tical reasoning
- reasoning, theoretical, *see*
 theoretical reasoning
- reflective equilibrium, 105
- reproduction, 76-80, 82. *See*
also generation
- respiration, 36, 52, 65, 119, 160,
 189, 324, 374-75, 380, 383-84
- rules of practice, 167-75, 198-
 201, 202-203, 210-20
- science, xv, xix, xxii; and meta-
 physics, 136-38; natural, 61-
 66, 67, 107-42; of practical
 deliberation, xxii, 165-75, 184
- scientist, natural, 60-62, 65, 92
- self-maintaining, 76-80, 84, 146
- self-nutrition, 76-77, 83-84, 101
- sense-perception (*aisthēsis*), 24,
 40, 48, 54, 73, 77-78, 82,
 89, 91, 101, 116, 144, 146-47,
 151-52, 154-57, 194, 223, 232-
 41, 246, 249, 255-61, 263, 266,
 277, 333, 335, 351, 359-60, 371-
 72, 374, 377

INDEX

- similarity, 223, 225-26
- sinews, 42, 157, 349
- sleep, 52, 117-18, 379-80, 383-84
- soul (*psychē*), 5, 7, 36, 46, 48,
 50, 68, 72-73, 143-64, 237, 300,
 303-304, 331, 333, 340, 358,
 364-68
- spine, 48, 67, 371
- spiritedness (*thumos*), 38, 42,
 333-36
- "stick" argument, 46-48, 364-68
- sublunary, 115, 133, 158, 280,
 311
- substance (*ousia*), 60, 64, 69, 95,
 124, 152, 246, 295-99
- theoretical reasoning, 165-84,
 185, 194, 202-203, 205, 215,
 266, 337, 342-43
- thinking (*nous*, *noēsis*), 38, 40,
 42, 44, 52, 54, 68, 154, 185,
 221, 232, 237-40, 244, 246, 257,
 265-68, 333, 341, 377
- title of *MA*, 273-74
- tortoises, xviii, 26, 287-88
- translation, method of, 20-21
- tuchē* (chance), xx, 206
- unmoved mover, 28-34, 120-21,
 127-40, 292, 297, 309, 319-21,
 338-39
- virtues, 211
- voluntary motion, *see* motion,
 voluntary
- vortex, 300
- water, 123, 158, 162
- weight, 132-33, 296, 300-302, 305
- wind, 288-90
- wish (*boulēsis*), 38, 42, 216,
 333-36, 346

INDEX OF PROPER NAMES

Ackrill, J., 148 n.7
 Aeschylus, 209-10, 244, 302
 Aetius, 314
 Agamemnon, 200, 209, 218-19
 Agathemerus, 288
 Albertus Magnus, xx n.8, 14,
 108 n.3, 157 n.22, 308, 326, 347,
 373, 381
 Alexander Aphrodisiensis, 6,
 6 n.15, 273, 300-301, 316, 347
 n.5
 Allan, D. J., 170 n.13, 189, 189
 n.40, 194, 197
 Anaxagoras, 61, 299, 352
 Ando, T., 183 n.31
 Andronicus of Rhodes, 4-5, 5
 n.9, 13
 Anscombe, G.E.M., 166 n.2, 186
 n.35, 189 n.39, 190 n.41, 203
 n.49
 Aquinas, T., 168-69, 169 nn.6,9
 Aristogenes of Knidos, 375
 Ariston of Ceos, 4, 4 n.7, 5, 12
 Aristophanes of Byzantium, 4
 n.8
 Arnim, H. von, 131 n.35
 Atlas, 30, 127, 127 n.29, 128-31,
 133, 138, 140, 282, 296, 300-304,
 306-12, 316, 320
 Atomists, 352
 Aubenque, P., 305 n.9
 Austin, J. L., 170, 170 n.11
 Averroes, 5, 5 n.14
 Ayala, F. J., 60 n.2, 93 n.44

 Balme, D., 6, 6 n.17, 12 n.33, 60
 n.2, 90 n.39, 93 n.44, 95 n.49,
 160 n.26-27, 161, 161 n.29, 163
 n.33

Barnes, J., 89 n.38, 112 n.10
 Baumstark, A., 5
 Beare, J. L., 6, 6 n.17, 160 n.27
 Beckner, M., 76 n.19
 Bekker, I., 14, 279, 292, 323, 326
 Biehl, W., 240 n.34
 Black, M., 226 n.10
 Block, I., 8, 8 n.24, 149 n.9, 153
 n.16
 Bonitz, H., 10, 151 n.12, 184
 n.32, 215 n.58, 245 n.39, 246,
 293, 320, 321 n.7, 349-50, 356,
 358, 375, 375 n.2
 Boorse, C., 76 n.19, 82 nn.25-26,
 97 n.53
 Boreas, 28, 289-90
 Brandis, C. A., 3, 3 n.1
 Browning, R., 16 n.5
 Bryson, 111
 Buridan, J., xx n.8, 130 n.31, 140
 n.48, 157 n.22, 189 n.40, 308,
 347, 381
 Burley, W., xxi n.8, 130 n.31,
 186 n.35, 308, 326, 347
 Butterfield, H., 94 n.46

 Canfield, J., 76 n.19
 Capelle, W., 107 n.2
 Carteron, H., 373, 373 n.1, 375,
 375 n.4, 376
 Chantraine, P., 351 n.7
 Charlton, H., 90 n.39, 94 n.46
 Cherniss, H., 131 n.35, 134 n.42,
 161 n.29, 298, 298 n.3, 303-
 304, 304 n.8, 381, 381 n.2
 Clark, S. R., 79 n.22, 97 n.53, 100
 n.1, 102 nn.3-4
 Commena, A., 16 n.5

INDEX OF PROPER NAMES

Cooper, J., 100 n.1, 106 n.8, 170,
 170 nn.12-13, 186 n.35, 192
 n.44, 204 n.50, 219 n.63, 258
 n.53, 334, 334 n.2, 346 n.3
 Coray, A., 333
 Critias, 303
 Cummins, R., 76 n.19, 82 nn.25-
 26, 84 n.32

 Democritus, 61, 61 n.4, 66 n.10,
 348
 "Democritus," 62-99 *passim*
 Dennett, D. C., 224 n.7, 228, 228
 n.15, 230 n.20, 246 n.41, 256
 n.49
 Descartes, R., 147, 155, 278
 Diels, H., 287-88, 314, 314 n.1
 Diogenes Laertius, xvii, 4
 Dodds, E. R., 218 n.61
 During, I., xxi n.8, 4 n.7, 11,
 11 n.30, 107 n.1, 143, 143 n.2,
 289 n.2, 298, 303, 304 n.8,
 322, 322 n.8

 Eleatic, 136, 138
 Empedocles, 61, 67, 79, 79 n.22,
 80, 80 n.23, 111, 207, 236 n.28,
 301, 352
 Etheridge, S. G., 180 n.26
 Eucken, R., 151 n.12
 Euripides, 244, 303

 Farquharson, A.S.L., xxi n.8,
 3, 20, 151 n.12, 157 nn.22-23,
 287, 290, 292-93, 297-98, 304,
 308-10, 317, 321, 324-25, 327,
 329, 334, 338, 342, 347, 349-50,
 352, 355-56, 360-62, 367, 373,
 375, 377, 381, 384-85
 Forster, E. S., 151 n.12, 284, 295,
 308, 316, 318, 327, 329, 334,
 339, 342, 346, 349-50, 355-56,
 373, 381, 385

Frede, M., 69 n.13
 Freudenthal, J., 221, 221 n.1,
 254, 254 n.48
 Furley, D. J., 118 n.18, 119 n.19,
 231 n.22, 347, 347 n.4, 380 n.1

 Galen, 314, 347 n.5, 348, 348 n.6,
 349
 Gauthier, R. A., 189 n.39
 Gaye, R. K., 119, 119 n.19
 Goodman, N., 226 nn.10-12,
 227, 227 nn.13-14, 228 n.16,
 229 n.17, 230 n.19, 261 n.61
 Grabmann, M., 16 n.6
 Grant, Sir A., 170 n.13, 189 n.39
 Greenwood, L.H.G., 170 n.13,
 189 n.39
 Guthrie, W.K.C., 131 n.35

 Hamlyn, D. W., 222 n.2, 223
 n.3, 239 n.32
 Hardie, R. P., 119, 119 n.19
 Hardie, W.F.R., 8, 8 n.24, 101,
 101 n.2, 149 n.9, 152 n.13,
 153 n.16, 183, 183 n.29, 184
 n.32, 189 n.40, 207 n.53, 344,
 344 n.2
 Heath, T. L., 316, 316 n.6
 Heitz, E., 375, 375 n.4, 376
 Hempel, C. G., 76 n.19
 Heraclitus, 98-99
 Hermippus, 4, 4 n.7
 Herodotus, 184 n.32, 254, 289
 Heron Alexandrinus, 347 n.5
 Hesiod, 300-302
 Hesychius, 4-5
 Hicks, R. D., 222 n.2, 223 n.3,
 240 n.34, 259-60, 260 nn.58-59,
 262 n.66
 Hintikka, J., 177 nn.19-20, 189
 n.40, 315, 315 n.2
 Hippolytus, 299

INDEX OF PROPER NAMES

- Hobbes, T., 73 n.16
Homer, 32, 59, 64, 71, 98, 140,
140 n.48, 289, 300, 311, 319-
21, 321 n.7
Hume, D., 88, 168 n.4, 188

Ideler, I. L., 316, 316 n.4
Iphigenia, 209
Irigoien, J., 14 n.3
Irwin, T. H., 166 n.3, 168 n.4
Ishiguro, H., 224 n.7, 229, 229
n.18, 230, 230 n.21, 231

Jaeger, W., xxi n.8, 3, 3 nn.2,4,
6-7, 7 n.19, 8-9, 9 n.26, 10, 10
nn.28-29, 11, 12 n.35 14, 16,
143, 143 n.2, 160 n.27, 279,
284, 287, 290, 292, 295, 323-24,
324 n.9, 326, 339, 373-74, 374
n.1, 375, 375 n.3
James, H., 221
Joachim, H. H., 170 n.13, 189
n.39, 296 n.2
Jolif, J. Y., 189 n.39
Jones, W.H.S., 354 n.2

Kahn, C., 11, 11 n.13
Kallias, 63 n.7
Kapp, J. C., 288
Keaney, J. J., 4 n.7
Kenny, A., 189 n.39, 343, 343 n.1
Kerferd, G., 162 n.32
Kim, J., 165 n.1, 176 n.18
Kirkias-Kirkios, 288-89
Kirwan, C., 178
Kolakowski, L., 210 n.54
Korsgaard, C., 216 n.60

Lambros, S., 4 n.8
Lee, H.D.P., 316, 316 n.5
Leibniz, G. W., 147 n.5

Leonicus, 14-15, 17, 17 n.7, 295,
339, 343, 355, 373
Lesky, E., 160 n.27
Littig, F., 5 n.9, 12
Litré, E., 354 n.2
Louis, P., xxi n.8, 9 n.25, 10, 13,
13 n.2, 14, 151 n.12, 251 n.46,
274, 279, 292, 298, 304-305,
307-308, 317, 323, 327-30, 334,
339, 342, 348, 355-56, 368,
373, 375, 375 n.4, 376, 381
Lucian, 289
Lycos, K., 242 n.36
Lysias, 184 n.32

Mackie, J. L., 79 n.22, 80 n.24,
177 n.20
Malcolm, N., xix n.6, 165 n.1,
179 n.23, 187, 187 n.37, 188,
188 n.38, 191 n.43, 205, 205
n.51, 206, 209
Mansion, A., 12 n.35, 107 n.1
Maritain, J., 103 n.5, 168, 168
n.5, 169, 169 nn.8,9, 216
Mayr, E., 60 n.1, 2
Merlan, P., 298 n.5
Michael Ephesius, xx n.8, 14-16,
16 n.5, 130 n.33, 185 n.33,
189 n.40, 282, 289, 308, 311,
317, 319-20, 323, 325, 327,
330, 339, 348, 352, 361, 373,
375, 381, 383
Milesians, 61
Moraux, P., 4, 4 nn.5,7, 5,
5 nn.9-10,12,14, 12, 12 n.34,
161, 161 n.29, 289, 289 n.2,
305 n.10, 334 n.1, 354, 354 n.1
Mozart, W. A., 229
Müller, A., 5 n.12

Nagel, E., 76 n.19
Nagel, T., 147 n.5, 225 n.8

INDEX OF PROPER NAMES

- Nicolaus of Damascus, 5
Nietzsche, F., xv, 171, 200-201,
220
Nuyens, F., 3, 3 n.3, 7-8, 8 n.22,
11, 11 n.30, 148-49, 149
nn.9-10, 150, 153 n.18, 155,
163

Olympiadorus, xvii n.5, 316
Ostwald, M., 215 n.58
Owen, G.E.L., xvi n.1, 11, 11
n.30, 96 n.52, 104 n.6, 110 n.7,
116 n.16, 134 n.41, 246, 246
n.40, 283, 283 n.2, 287, 294
n.1, 338, 338 n.3
Owens, J., 60 n.3

Parmenides, 136-38
Peck, A. L., 6, 6 n.17, 157 n.22,
160 nn.26-27
Peters, F. E., 5 n.11
Philia, 326 n.28
Philoponus, 6, 6 n.15, 290, 316,
373
Ps.-Philoponus, 347 n.5
Picasso, P., 226 n.10, 227, 227
n.13
Place, U. T., 225 n.8
Plato, xvi, xvii, xvii n.5, 81, 88,
95, 95 n.48, 97, 97 n.53, 98,
104, 129, 136, 165-66, 173-74,
184 n.32, 212, 218 n.61, 232
n.24, 241 n.35, 242, 242 n.36,
243, 243 n.38, 244, 267, 283,
201-204, 321, 333, 335, 338,
339, 347 n.5, 384
Platt, A., 160 n.26, 287, 300, 328,
328 n.1, 329-30
Plezia, M., 5 n.9, 13
Polybius, 254
Pompey, 173

Poppelreuter, H., 7, 7 n.20
Preus, A., 160 n.26, 162, 162 n.31
Price, H. H., 224 n.6, 225 n.8,
226 n.12, 266 n.67
Prichard, H. A., 170, 170 n.11
Psellus, 16 n.5
Ptolemy, 5
Putnam, H., 62 n.5, 69 n.14, 73
n.15, 165 n.1
Pythagoreans, 298, 314
Randall, J. H., Jr., 60 n.2
Rawls, J., 105 n.7, 199 n.48, 211
n.55
Rees, D. A., 223 nn.3-4, 241 n.35
Reiche, H.A.T., 162, 162 n.32
Rodier, G., 239 n.33, 240 n.34
Rolfes, E., 7, 7 n.21, 8
Rose, V., 3, 3 n.1, 6, 6 n.16, 7,
9, 113, 113 n.11, 375
Ross, W. D., 6, 6 n.17, 8, 8 n.23,
95 n.48, 96 n.52, 101, 116
n.17, 149 n.10, 160 n.27, 169,
169 n.10, 170 n.13, 215 n.58,
223 n.3, 233 n.26, 240 n.34,
258 n.55, 263, 263 n.65, 284,
299, 319
Rüsche, F., 160 n.27, 161, 161
n.29
Ruse, M., 76 n.19
Ryle, G., 224 n.7

St. Hilaire, B., 348
Santas, G., 186 n.35, 189 n.39,
195 n.45, 198 n.47
Sartre, J.-P., 224 n.7, 229, 229
n.18
Scheffler, I., 76 n.19, 80 n.24
Scherling, K., 290 n.3
Schofield, M., 269 n.71
Sellars, W., 73 n.15
Shorter, J. M., 224 n.7
Sidgwick, H., 105 n.7

INDEX OF PROPER NAMES

Simplicius, 5 n.10, 6, 6 n.15,
109, 273, 300, 375
Simpson, G. G., 60 n.1
Siwek, P., 157 nn.22-23
Skemp, J., 162 n.30
Skinner, B. F., 94 n.46
Slakey, T., 147 n.4
Smith, P. M., 151 n.12
Socrates, 63 n.7, 88, 104, 165-67,
171, 173-74, 201, 210, 217,
220, 257 n.52, 283, 321
Socrates the younger, 72
Solmsen, F., 134 n.42, 160 n.26,
162 n.30, 32, 163 n.33
Sophocles, 173
Sorabji, R.R.K., 76 n.19, 147
nn.4-5, 148 n.7, 222 n.2
Speusippus, 298, 298 n.5
Spumonias, 288-89
Stein, G., 227, 227 n.13
Steinschneider, M., 5 n.11-12
Stewart, J. A., 170 n.13, 235 n.28
Stewart, Z., 236 n.28, 243 n.38
Stoics, 383
Strawson, P. F., 259 n.56

Tacitus, 173
Taylor, C., 62 n.5, 80 n.24, 147
n.4
Themistius, 6, 6 n.15, 233 n.26,
273
Theophrastus, 298
Thielscher, P., 10 n.29
Thrakias, 288-89
Thrasymachus, 88, 95, 98
Tityus, 28, 289
Torraca, L., xxi n.8, 3, 3 nn.3-4,
8, 10 n.29, 11, 11 n.29, 15, 15
n.6, 130 n.32, 151 n.12, 273,
284, 288, 289 n.2, 290, 293,
305, 308-309, 317, 327, 330,

334, 342, 348, 355-56, 362, 373,
375 n.5, 376, 381, 383
Urmson, J., 210 n.54
Vergil, 302
Wachsmuth, R., 321 n.7
Wagner, R., 229
Walsh, J., 189 n.40
Walton, K., 226 n.10, 227 n.14
Walzer, M., 173 n.16
Wartelle, A., 13 n.2
Webster, E. W., 316, 316 n.4
Wehrli, F., 4 n.6
Wernicke, K., 289, 289 n.1, 301
n.6, 302
White, N. P., 234 n.27
Wieland, W., 60 n.2, 42 n.43, 94
n.46, 95 n.48, 96 n.51, 206 n.52
Wiersma, W., 162 nn.30, 32
Wiggins, D., 62 n.5, 73 n.16,
148 n.7, 153 n.16, 165 n.1, 170
n.13, 178 n.21, 186 n.35, 190
n.41, 215 n.59, 234 n.27, 259
n.56
William of Moerbeke, 14-16, 16
n.6, 151 n.12, 273, 288, 290,
337, 355, 373, 384
Williams, B.A.O., 165 n.1, 172
n.15, 183 n.30, 196 n.46
Williams, C.J.F., 315 n.3
Wilson, J., 282, 282 n.1
Wittgenstein, L., 224 n.7, 226
n.10, 227 n.13, 229, 229 n.18,
230, 320 n.21, 231 n.23, 246,
246 n.42, 256 n.50, 256
Wollheim, R., 226 n.10
Wright, G. H. von, xix n.6, 88
n.37, 165 n.1, 175-76, 176 n.18,
178, 178 n.22, 179 n.23, 180,
180 n.25, 186, 186 n.36, 187
n.37, 188, 188 n.38, 189 n.39,

INDEX OF PROPER NAMES

190 n.42, 191 n.43, 192 n.44,
194, 205, 205 n.51, 206, 207
n.53
Wright, L., 76 n.19, 82 n.26, 85
n.33
Xeuxis, 289
Zeller, E., 3, 3 n.1, 7, 7 n.18,
70 n.3, 74 n.17, 375, 375 n.2
Zeus, 140, 311, 320-21

INDEX LOCORUM

Aristotle
Organon
 112-13, 184
Categories
 69; 5: 259 n.56; 7: 358
 15a13 325
 15b3-6 307
De Interpretatione
 1: 260 n.60; 9: 206 n.52, 268
 n.69, 315
 18b26ff. 206 n.52
Analytics
 184
Prior Analytics
 I: 1.30: 109 n.4
 24a22ff. 345
 46a17 111
 46a17ff. 109 n.4,
 110 n.5,
 112
 67a33ff. 342
 67a37 342
 II: II.21: 342
Posterior Analytics
 109, 111-13, 141, 171 n.14, 172,
 174 n.17, 299
 I: I.18: 240, 266; I.27: 109 n.4
 74b25 109 n.4
 75a37 111
 75a37ff. 110 n.6
 75b40 111
 76a16ff. 113
 76a22 110 n.7
 76a22ff. 110
 76a26-30 109 n.4
 76a37-b2 110 n.8
 76b16ff. 345
 77a22-25 110 n.8

81a38ff. 266
 84b14-18 109 n.4, 110
 n.6
 85a31 213 n.57
 87a36 296, 299
 88a31 109 n.4, 110
 88a31ff. 113
 88a33 296
 88b1-3 110
 88b25ff. 110
 88b25-29 110 n.8
 II: II.19: 138
 94b19ff. 92
 94b36-37 92
 95a1 94
 95a1-2 94, 322
Topics
 I: 100b21 xvi n.3
 101a33 xvi n.2
 104a8-10 xvi n.3
 II: 115b14ff. 315
 115b17-18 315
 IV: 126a12-13 355
 VI: 140b27 335
 146b3-6 335
 146b36-147a11 338
 VIII: VIII.1-3: 345
 160a33ff. xvi n.2
De Sophisticis Elenchis
 274
 171b12-18 111
 172a2-7 111
Physics
 10, 108-9, 116-17, 119, 122, 125,
 127, 130-32, 134, 139-40, 319, 383
 I: 116
 184a23-24 116 n.17
 184b2-4 269 n.70

INDEX LOCORUM

18412-14 116
 184b25-85a14 136 n.45
 185a12-b13 137 n.46
 190b5 350
 II: 62, 114, 206, 322; II.1: 136;
 II.3: 83, 102; II.7: 91, 95; II.7-8:
 81; II.8: 67, 79, 94; II.8-9:
 89; II.9: 180
 193a3-9 136 n.45
 193b32ff. 72
 194a13-15 72
 194a18-19 61
 195a24-26 338
 195b3ff. 83
 197a2 304
 198a17 342
 198a22-23 62
 198a25-26 61
 198b5-6 65
 198b5-9 92
 198b6 91
 198b7-8 91, 95
 198b8-9 80
 198b18 322
 198b18-19 66
 198b23ff. 79
 198b34-36 80
 199b9ff. 94
 199b9-13 80
 199b15-18 80, 96 n.52
 200a1-5 94, 322
 200a7 92
 200a15ff. 180
 200a31-35 93
 III: III.1: 358; III.5: 312, 318
 200b28-31 358
 203b30 315
 204a3ff. 313
 204a34ff. 312
 204b15-19 312
 204b20-22 312
 204b22-35 312
 204b35-205a7 312
 205b24-31 312
 205b31-35 312
 205b35-206a7 312
 206b7ff. 156 n.21
 IV: IV.1: 299; IV.7: 350;
 IV.11: 283
 208b8-9 377
 208b10-11 299
 208b21-22 299
 209a11 297
 210b21-22 152 n.17
 212b24 297
 214a32ff. 350
 219b19 283
 222b14 319
 V: V.4: 283
 225b29-31 322
 226b21-23 294
 227a28 297
 VI: VI.1: 297; VI.10: 121, 123
 n.24
 235a20 278
 237b25 278
 240b8ff. 280
 VII: VII.2: 377; VII.3: 350
 243a3 284
 243a8-10 325
 243a14 284
 243a16-17 377
 243b12 324
 243b16-244a6 377
 245a8 284
 245b1 284
 VIII: 10-11, 94, 114, 116-17,
 120, 122, 131, 138, 140, 161, 273-
 74, 277, 294, 306, 312, 318-20,
 322, 325, 327, 380-81, 384;
 VIII.1: 118, 319; VIII.2: 118-19;
 VIII.4: 118, 122, 125, 132, 159;
 VIII.5: 121, 319; VIII.5-6: 117;
 VIII.6: 118; VIII.7: 326-28;
 VIII.8: 118, 362; VIII.9: 118;

INDEX LOCORUM

VIII.10: 131, 132 n.36, 138-39,		<i>De Caelo</i>	
293, 312, 318		13, 108-9, 114, 121, 126-29, 131-	
251a28-29	278	32, 134, 282, 305, 313, 315, 319,	
251b3	357	370	
252a5-32	319	I: 318; I.2: 274; I.2-4: 302; I.3:	
252b24	97 n.53	317; I.5: 351; I.5-7: 318; I.9: 293;	
253a7-8	117	I.10-12: 312, 315 n.3; I.11: 315	
253a11ff.	327	268a1-6	109
253a11-21	117, 380	268b14-15	377
253a15ff.	384	268b29-269a2	377
254a16	319	269a28-30	377
254b17ff.	159	270b5ff.	132 n.39,
254b19-20	278		133-34
254b28-33	118	270b19-20	134 n.43
254b30ff.	288	270b22	317
255a11	278	271b12	351
255a12ff.	123 n.24, 280	273b30-31	278
255a34	357	274a15-16	278
256a1-2	322	274b5	377
256b2	132 n.39	274b23ff.	318
258a25-30	282	276b27-28	278
259a18	297	278b9ff.	293
259b1-3	323	278b14-15	132 n.39, 133
259b1-15	119	280b32	315
259b1-16	380	281b3ff.	312, 315
259b7ff.	384	283a35-b5	135
259b10-11	278	284a2ff.	135
259b11ff.	327	284a18	301
259b30-31	132 n. 39	284a18-35	303
260a19	278	284a19ff.	301
260a25	278	284a24	301
260a29-b15	327	284a32	132 n.39
260b30ff.	328-29	284b13	10
261a7	327	284b13-14	274
261a7-10	326	286a12-21	128
262a18	262 n.64	286a13ff.	295
263a24	362	286a15	295
264a29	278	288a11	278
265a4-5	278	288b12ff.	158
265a8	278	288b21ff.	298
265b1	295	290a6-7	295
267a24ff.	293	290a29-b8	123 n.25, 280
267b20-22	312	290b2	295

INDEX LOCORUM

291b16	280	II: II.2: 354, 357; II.10: 121, 125,	
291b24	135	141, 298; II.11: 90, 315	
291b25-28	xvii n.4, 137	332a16	213 n.57
	n.47	329b26ff.	357
292a18-21	132 n.39, 133	337b5ff.	315
II: 295; II.1: 158, 300-1, 304;		337b14ff.	90
II.2: 298; II.3: 127, 295; II.6:		<i>Meteorologica</i>	
158, 298; II.8: 123 n.25, 295;		109, 117, 141, 274, 284, 288, 376	
II.12: 132 n.39; II.13: 301		I: 338a26-29	107-8
293a27-30	xvi n.2	338a24	275
293b6-7	370	339a5-9	107-8
298a8-9	306	339b19ff.	134 n.43
III: III.2: 301		340a6-8	306
298b18ff.	136 n.45	340b6-7	316-17
299a30ff.	297	341a2-3	316
299b8-9	305	341a3	317
304b14	377	349b2	290
305a25	342	352a27-28	306
306a5ff.	xvi n.2, 279	II: 362a30	293
306a6ff.	109 n.4, 110-	366b15	352
	11	368b23	352
IV: 308a29-31	305	III: 283	
308a31-33	305	IV: IV.1: 354, 357	
310beff.	305	378b15ff.	357
312a10	371	378b31-34	94, 322
<i>De Generatione et Corruptione</i>		380a2	280
91, 91 n.41, 108-9, 274, 294		381b13	375
I: I.3-5: 325; I.5: 350; I.6: 296;		382a8ff.	357
I.6-9: 291; I.7: 291; I.7-9: 357		<i>De Anima</i>	
316a5-14	xvi n.2, 279	7-8, 9 n.27, 10-12, 12 n.35, 62,	
317a25-26	325	73, 133, 143, 146, 149-52, 154,	
319b31-320a2	325	203, 223, 233, 238, 251, 255, 258-	
320a11	285	59, 260 n.60, 273, 275, 334, 361,	
320a12-15	325	363, 370, 376, 378	
320a26	285	I: 152; I.1: 237-38; I.3-4: 331;	
322b18-19	296	I.5: 360	
322b32-33	296	402b3-5	276
323a1-2	296	402b6	133 n.40
323a8-9	297	402b22-24	246
323a12-34	294	403aff.	237
323a31ff.	294, 297	403a5-7	148
325a13ff.	xvi n.2	403a8-10	237
		403a15	148

INDEX LOCORUM

403a16ff.	385	418b6-10	162
403a17	355	418b7ff.	317
403a18-19	148	418b11	317
403a29ff.	65, 89	420a29	253
403a31-b1	147, 352	420b31ff.	259
403b8-9	65	422a26	314
404a17	304	424a17	147 n.3, 256
406a27	162		n.51
407a23	333	424a18-19	258
408b4ff.	148	424a21ff.	258 n.54
411b21	360	424a25	235
II: II.1-2: 152; II.2: 236; II.4:		424a33ff.	258
149; II.5: 258; II.8: 259; II.12:		424b16-17	148 n.8
258-59		III: xxii, 8, 149 n.10, 175, 201,	
412a5	275	232, 240; III.3: 221-22, 249, 251-	
412a6-b9	68	52, 256, 334; III.3-5: 239; III.5:	
412a14-15	76, 78	268 n.69; III.7: 237 n.29, 238-39,	
412a27-28	73	264-65; III.7-8: 237, 250; III.8:	
412a27-b1	149	240, 266-67; III.9: 83, 232 n.24,	
412b4	275	265, 234-35, 337, 382-83; III.9-10:	
412b6-9	73	168 n.4, 203, 333; III.9-11: 86,	
412b10ff.	71	221, 223 n.3, 321, 246, 356;	
413a22ff.	77	III.10: 8-9, 150, 157 n.23, 237,	
413b21ff.	236	237 n.29, 284, 333, 361, 363, 377;	
414a4	335	III.11: 177 n.20, 191, 201, 234,	
414b2	334	236, 262, 264; III.12: 82	
414b5-6	335	425b25	235
414b18	133 n.40	425b26	346
414b22ff.	275	425b27	147 n.3, 256
414b23	275		n.51
415a10ff.	236	426a16	147 n.3, 256
415a24ff.	77		n.51
415a25-26	77	427a2	363
415a25ff.	78	427a3	147 n.3, 256
415b8-12	61		n.51
415b18-20	150	427a7	363
415b28ff.	79	427a10	281
416a8-18	79	427b17ff.	252
416a14-16	80	427b19-20	256
416a17-18	77	428a1-4	252
416b9-11	76	428a7	253
416b9-20	330	428a8-9	256
416b30	375	428a10ff.	236

INDEX LOCORUM

428a11	222	433a22	335
428a11-12	256	433a27	338
428a14	253	433b10	203
428a14ff.	252	433b11	86
428a21-23	262 n.64	433b12	86
428b2-3	253	433b19ff.	144
428b2-4	248	433b19-30	9
428b13	346	433b21	356-57
428b14	251	433b21ff.	281
429a1-2	249	433b22	362
429a5	251	433b22ff.	361
429b20ff.	257 n.52	433b24	363
430a26ff.	248 n.43	433b24-25	157 n.23
430b26-30	258 n.54	433b25	281
431a8	222	433b25-26	377
431a14	147 n.3, 256	433b26-30	221, 233
	n.51	433b28	222, 263
431a14-17	239	433b29-30	263
431a19	147 n.3, 256	433b31ff.	87
	n.51	433b31-434a10	234
431b2	265	434a6	263
431b2ff.	239	434a7-10	263
431b6-8	264	434a8ff.	183 n.31, 191
432a3-10	240	434a8-10	182
432a6-7	266	434a11	264 n.66
432a9-10	257 n.52	434a16ff.	202
432a15ff.	334	434a30ff.	78
432a17	278	434b25	279
432a31	234	<i>Parva Naturalia</i>	
432b1	147 n.3, 256	5, 8-9, 10 n.27, 12, 108, 108 n.3,	
	n.51	146, 221-23, 248, 250-51, 258,	
432b5	335	273, 359	
432b14	278	<i>De Sensu</i>	
432b15	233	10, 12 n.35, 274; 1: 266	
432b15ff.	221	432a2ff.	266, 269 n.70
432b25	356	436a9	9
432b26	279	438b30-439a5	372
432b28ff.	382	455b16ff.	266
432b29ff.	382-83	<i>De Memoria</i>	
433a9-10	333	10, 12 n.35, 251, 267, 355	
433a15	86	449b27-28	356
433a20	86, 233 n.26	449b30ff.	250
433a21	203	449b31ff.	266

INDEX LOCORUM

450a29-30	249	480a2-4	383
450b20ff.	355	480a13ff.	350
450b21	235	480a16-17	383
450b25ff.	250	<i>Historia Animalium</i>	
451a1	250	xviii, 4, 4 n.8, 10, 14 n.3, 253-54,	
451a15	250, 355	273	
451a15-16	249	I: 487a11-12	342
451b26	351	487b18ff.	279
452b24	346	487b18-21	278
<i>De Somno</i>		487b31	279
10, 12 n.35, 274, 376; 3: 383		491a7-14	279
454b24	335	494a1-2	285
455b34-456a2	372	II: II.1: 275	
456a6-10	377	500a3	253
456a11-13	374	501a1-3	278
456b2	375	502b12	285
457b15-16	352	503b23	346
458a10ff.	383	505a20	371
<i>De Insomniis</i>		506a19	287
248; I: 12 n.35		III: 511b20	349
458b15ff.	250 n.45	515a32-34	349
459a15	234	515a33	349
460b2-3	250	515b9	349
460b16-18	250	515b12	349
460b19	245	515b23-25	349
461b29ff.	249	516a8	349
<i>De Divinatione per Somnum</i>		V: 541a32	350
9, 9 n.27, 12 n.35, 274		547b27	287
<i>De Longitudine Vitae</i>		558a8-11	287
274		VII: 587b30	350
465b15ff.	357	VIII: 589a28	287
<i>De Juventute</i>		589a29	287
274		590a1-4	351
468a13-469b20	372	599b26ff.	287
469b13-17	7, 153 n.18	600b22	287
475a8	374	606a12ff.	85
<i>De Respiratione</i>		606b23	85
470b17-18	287	IX: 262 n.64	
475b28	287	<i>De Partibus Animalium</i>	
476a24-25	349	10, 12, 12 n.35, 141, 273, 376	
479b17-480a15	376	I: 62, 275; I.5: 98 n.54, 109, 141	
479b19ff.	350, 355, 383	n.50	
479b26ff.	383	639b1-3	279

INDEX LOCORUM

639b12	285	654a36ff.	281
639b12ff.	74	656a27	184 n.32
639b30ff.	180	656a27-29	372
640a18ff.	78	659b13-18	374
640a19ff.	67, 79	661a8	335
640a23ff.	70	III: 662b25	253
640b4ff.	61	665b18-20	370-71
640b22ff.	63	666a16-17	384
640b28	70	666a20-22	384
640b30-641a17	71	666b6-8	370
641a7-17	71	669a1-2	374
642a1ff.	89	669a19ff.	383
642a31ff.	65	670a23-26	7
642a32	89	670a26ff.	153 n.18
642a32ff.	147	671a31	288
642a35	92	671a35	288
644a29-b7	275	674a20	375
644b22	133	IV: IV.4: 377	
644b22ff.	109	677a17-19	83
644b31-35	135 n.44	678a16	375
645a7ff.	109, 356	678b1-4	372
645a25	334	679a25-26	355
645a27ff.	141 n.50	683a19	349
645a32ff.	349	683b7	349
645b15-24	98 n.54	685a15	279
II: II.3: 377		687a19-21	349
646a16-18	354	692a23-24	355
646a25	371	696a11	10
646b10	328	696a11-12	274
646b15	341	696b26	95
646b25ff.	356	<i>De Motu Animalium</i>	
647a3	356	I: xvi n.2, 114 n.12, 120-22, 129,	
647a14-30	356	140, 281, 286, 295, 322, 358-59,	
647a24ff.	372	362; I-2: 121, 125, 311, 353; 2:	
648b18ff.	350	9, 120-25, 127, 140-41, 291-93,	
650b10	375	362; 3: 120, 120 n.20, 121, 123,	
650b20ff.	356	125 n.27, 129, 140-41, 159 n.24,	
650b27ff.	355	282, 286, 303, 319; 3-4: 121, 125;	
650b35	352	4: 120, 130, 132, 139, 292, 306,	
653a10ff.	383	317, 331-32; 5: 156 n.21, 157	
653b3-8	357	n.22, 274; 6: 59, 66, 94, 120-21,	
653b13	375	132, 190, 232, 276, 288, 311, 333,	
654a8	287	341, 353-54, 381; 6ff.: 231; 6-7:	

INDEX LOCORUM

86, 89, 168 n.4, 265, 384; 6-8: 9,	698b9	123 n.26
144, 146, 150, 154, 163, 232; 6-9:	698b10-12	124
374; 6-10: 121: 7: 12, 151, 175,	698b12	138
192 n.44, 201, 207, 240, 264, 278,	698b15-18	123
331, 353, 358; 7ff.: 143; 7-8: 89,	698b16	xviii
149, 188, 381; 8: 81, 144, 155,	698b17	xviii, 278
222, 237, 285, 300, 338, 351-52;	698b19	15, 124
8-9: 121-22, 152, 152 n.15, 280,	698b20	124
322, 359, 381; 9: 284, 359, 385;	698b22-25	124
9-11: 381; 10: 143-46, 149-50,	699a3	124
156, 160, 163, 307, 331-32, 360;	699a5	124
11: 83, 119, 155, 277, 324, 360,	699a5-6	294, 307
363, 381	699a6	124
698a1	699a9	124
698a1-7	699a9-11	124
698a1-14	699a10	124
698a3	699a14	311
698a4	699a14-15	141 n.49
698a5	699a15-16	127
698a5-7	699a16	126
698a7-14	699a17-24	126
698a9	699a20-24	282
698a13	699a23-24	278
698a13-14	699a25	138
698a13ff.	699a27	127 n.29
	699a27-31	127
698a16	699a31-32	282
698a18ff.	699a32-33	128, 130
698a18-19	699a32-b1	130
698a19	699a33-b10	128
698a21	699b1	302
698a24	699b5	14
698a24-b1	699b6-8	359
	699b7	130
698a24ff.	699b13	139
698a26-27	699b14-17	318
698b1	699b15-17	139
698b1-2	699b16-17	318
698b2	699b19	14
698b4-7	699b22	318
698b6	699b25-26	139
698b6-7	699b34	138
698b8ff.	699b34-35	319

INDEX LOCORUM

699b35-36	140	701a3	20
699b36-700a6	140	701a4-6	151, 155, 333
700a2-3	20	701a5	336
700a4	319	701a5-6	341
700a11	132 n.38	701a5-7	237
700a11ff.	94 n.47, 161	701a7	333
	n.28, 331-	701a7-8	185
	32	701a10-13	186
700a12	9	701a12-13	151
700a16ff.	132	701a13-14	195
700a16-18	300	701a14-15	195
700a17-18	332	701a16	190
700a23-24	16-17	701a16-17	194
700a26	16	701a17-19	194
700a29	20	701a18	233 n.25
700a30	329	701a19-20	194
700a31-32	326	701a21-22	194
700b3	15	701a22-23	151, 186, 189,
700b4-6	152		343
700b5-6	10	701a24	15
700b6	300, 323	701a24-25	189
700b8	10	701a26-28	196
700b10	152	701a29	232
700b14	14	701a32	232
700b15-17	353	701a32-33	190, 194, 341
700b16-17	59	701a33-34	186
700b17	150, 341	701a33-36	155
700b17ff.	232	701a34-36	238
700b17-23	190 n.42	701b1ff.	12, 188
700b18	185 n.34	701b2	15
700b18-19	276	701b2ff.	144
700b20	15, 223 n.4,	701b4	15
	333	701b4-6	154
700b21-22	10	701b13	21
700b24-25	333, 353	701b13-19	144
700b25	14	701b16	151
700b26-28	209	701b16ff.	152
700b29	334	701b16-18	156
700b29-32	332, 381	701b16-22	354
700b30	158	701b17ff.	238-39
700b31-32	332	701b17-18	147
700b35	16-17, 140	701b17-21	257
701a1	154	701b18-19	238

INDEX LOCORUM

701b19ff.	257	702b4-5	364
701b19-23	384	702b6-7	285, 366
701b20	20	702b7-11	367
701b20-22	238	702b12	277
701b21	257	702b16	153
701b23	154 n.19	702b18	373
701b23-24	144, 350	702b19	14 n.4
701b24-32	155	702b19-20	277
701b33-34	xviii	702b20-21	359
701b33-35	233 n.25, 237	702b20-25	351
	n.29	702b21-25	155
701b34-35	151, 156, 156	702b25-26	157 n.23, 363
	n.20, 157	702b30-31	9, 157 n.23,
			284, 363-64
701b34-702a5	144	702b34-35	373
701b37-702a1	20	703a3	10
702a1	151	703a3-4	153, 369
702a2-3	154 n.19	703a4-6	145, 156
702a2-5	352	703a6	143, 332
702a3-5	151	703a6-9	161
702a5	251 n.46	703a9	332
702a9-10	354	703a9-10	145, 161
702a10ff.	144	703a10-11	7
702a10-21	145	703a11-14	157 n.23
702a13	15	703a12	153
702a14-15	361	703a12-14	362
702a16ff.	356	703a15-16	145
702a18ff.	222, 233	703a17	10
702a21	280, 372	703a18-19	145, 161
702a22	15, 357	703a19ff.	9
702a30	157 n.23,	703a22	14 n.4, 161
	362, 385	703a23-24	145, 161
702a30ff.	9	703a25	156 n.21
702a30-31	361	703a25-26	161, 307
702a31	360	703a26	94
702a32	153	703a28-29	143-45
702a35	365	703a28-b2	153
702a35-36	364	703a29	360
702a36-b1	365	703a29-b7	145
702b1ff.	367	703a36	379
702b1-2	20, 366	703b2	277, 322
702b2	153	703b2ff.	278
702b3	87	703b4	15
702b3-4	366-67		

INDEX LOCORUM

703b11-13	350	731a24	356
703b18	238	II: II.1: 326, 328; II.6: 376; II.	
703b19ff.	257	6-7: 377	
703b19-20	257	731b27-31	133
703b21-22	360	732a6	164 n.34
703b22	15	732b27	349
703b22-23	20	734b2-3	356
703b29ff.	363	734b11ff.	347 n.5
703b32-33	362-63	734b27-28	356
703b37	384	735a12	328
704a2	15	735a13-14	326, 330
704b1	10	736a1	161
704b2	273	736b29	317
704b3	10	736b30ff.	159-60, 160
			n.26
<i>De Incessu Animalium</i>			
4 n.8, 5, 9-10, 12, 108, 273-75,		736b33-737a1	374
280-81; 3: 121, 123 n.24, 279-81,		738a13-18	357
285; 4: 274; 7: 274; 9: 280-82		740a25	330, 328
704a7-9	274	740b1-24	358
704b9-10	275	740b28	346
704b21	279	740b31ff.	354
704b22-23	377	741b9ff.	347 n.5
705a4ff.	285	741b12ff.	357
705a7ff.	124, 286	741b12-15	357
705a12	285	741b37ff.	160, 374
705a14-15	280	742a14-16	376
705a29ff.	371	744a3	160, 374
705b18-20	370	748a7ff.	109 n.4, 110
705b22	356		n.9
706a24-26	371	III: 752b17	328
708b25	280	752b18	328
708b26ff.	280	757b35ff.	279
708b27	278	760b28ff.	213, 279
709b7	285	761b22	315
711a18	356	762a29-31	357
713a17	288	IV: 765b36	349
713a17ff.	288	767a22	328
<i>De Generatione Animalium</i>			
10-12, 12 n.35, 146, 160 n.26, 162,		768b18ff.	290, 294
274, 290-91, 314, 327, 376		768b23-24	291
I: 716b3ff.	351	774b5ff.	328
725b17-18	355	774b6	328
729a23-24	279	V: V.1: 83, 89, 92; V.4: 377	
		778b3ff.	78

INDEX LOCORUM

781a24	374	1016b25	297
781a24ff.	160	1019b33	253, 253 n.47
783a37-b2	350	1020a8	306
784b2	375-76	1020b29-30	358
784b2-3	377	1021b28	253 n.47
788a11ff.	351	1022a4-5	332
788b19ff.	279	1022a6-8	332
789b8ff.	160	1022b15-19	154 n.19
789b8-9	374	1022b19	356
		1022b22ff.	314
<i>Problemata</i>		1023a8-11	153 n.17
IV: 352		1023a20ff.	300
VIII: 888a12ff.	350, 355	1023a23-25	153 n.17
889a15-16	352	1024a6	253 n.47
XI: 902b37-39	355	1024b23	247
903a2-4	352	1024b24-26	247
XVI: 913b38	348	1025a5ff.	247
		VI: 1026a2-3	72
<i>Metaphysics</i>		1026a13	283
10, 361		1026a15	342
I: 12, 266; I.1: 269 n.70		VII: 62-63, 68-69, 69 n.13, 181-	
980a1	xv	82, 191, 207, 361; VII-VIII:	
980a26-27	269 n.70	257 n.52; VII.1: 259 n.56; VII.	
980b25-27	193, 262 n.64	4: 259 n.56; VII.5: 259 n.56;	
983a12	347 n.5	VII.7: 179, 183 n.29; VII.10:	
983b3ff.	62	152; VII.10-11: 73; VII.11: 72,	
987a2ff.	283	147, n.6; VII.13: 213 n.57; VII.	
988b17ff.	62	16: 213 n.57, 360; VII.17: 63	
989a29ff.	298	1030a34	350
989b32	283	1032b6-9	179
990a8ff.	298	1032b18ff.	179
III: 296; III.5: 296		1032b18-31	170 n.13
997a34ff.	283	1034a5-8	63 n.7
1001b26ff.	296	1035a7-9	63
IV: 1006a3-11	136 n.45	1035b25-26	153
V: 302; V.1: 351; V.5: 177;		1036a32ff.	70
V.15: 358; V.17: 332; V.22:		1036b22-24	73
314; V.23: 300; V.29: 247		1036b27ff.	72
1013b26-28	338	1040b10ff.	360, 364
1013b27	293	1040b14	69 n.13
1014b27	69 n.13	1040b26	213 n.57
1015a11	253 n.47	1041a4	213 n.57
1015a20ff.	178	1041b6-8	63, 70

INDEX LOCORUM

1041b12ff.	73	1076a3	320
1041b12-16	148	XIII: XIII.1-3: 296; XIII.6-9:	
1041b27ff.	63	296	
1041b28-31	69 n.13	1076a4	297
VIII: VIII.3: 296		1077a36-b4	296
1042a1ff.	184 n.32	1078b11ff.	283
1043a4	69 n.13	1079b4	275
1043b21	69 n.13	1085a32-34	298
1044a7-9	296	1085b27-35	298
1044b12	66, 94, 322	XIV: XIV.1-3: 296; XIV.	
IX: IX.2: 380; IX.3-4: 315;		5: 296; XIV.6: 296	
IX.5: 216, 278, 380; IX.10: 267		1088a31-33	325
n.68		1090b5-13	298
1046a6ff.	297	<i>Nicomachean Ethics</i>	
1048a5ff.	358	xxii, 100, 103, 105, 106 n.8, 171	
1048a16-20	343	n.13, 175, 192 n.44, 278, 346	
1048a21-24	216	I: 106, 168, 174, 210; I-IX: 106	
1049a5-9	343	n.8, 170 n.12; I.7: 100	
1049a28	213 n.57	1094a33-34	105
1051b17ff.	248 n.43	1095a6ff.	105
X: 1052a20	297	1095b19	106
1053b16	213 n.57	1097b25ff.	101
1057b35-37	275	1097b34	102 n.3
XI: XI.10: 235		1098a20	104
1064a3	283	1098b10ff.	104
1066a33	235	1101a34	184 n.32
1069a12	297	1101b12ff.	339
XII: 10, 116 n.15, 121, 131-32,		II: 1103b26	215
236 n.28, 294, 321; XII.7: 331;		1104a1-2	215
XII.8: 298; XII.10: 96, 320		1104a3-10	214
1069b9-13	325	1107a1	211
1070a1	284	1107a20ff.	371
1070b27	284	1107a22-24	371
1070b34-35	284	1107a29-32	211
1071a36	284	1107a33	352, 355
1072a26ff.	381	1109a34	283
1072a27	336-38	1109b23	153 n.17
1072b3-4	331	III: 170 n.13, 207, 277, 322;	
1072b28	132 n.39	III.1: 216, 379-80; III.4-5: 231	
1074a38ff.	134 n.43	n.22	
1075a16ff.	164 n.34	1110a4ff.	216
1075a16-25	96	1110a16	356
1075b2ff.	236 n.28	1110a29-30	217

INDEX LOCORUM

1110b9-15	380	1140d6-7	347
1111a24ff.	380	1141b23	234
1111a30-31	336	1141b23ff.	235 n.28
1111a32	335	1142a20ff.	204
1111b16	335	1142a23	215
1111b19	335	1142b21	184
1111b26	170 n.13, 335	1143a10ff.	334
1112b11ff.	171 n.13	1143b1-3	184, 342
1112b11-12	170 n.13	1143b4-5	215
1112b15	192	1144a7-8	170 n.13
1112b15ff.	177 n.20, 181	1144a31ff.	183-84
1112b34-35	170 n.13	VII: 104, 175, 197, 201, 245;	
1113a5	335	VII.3: 201, 342	
1113a10-11	337	1145b2ff.	105
1113a14-15	170 n.13	1145b2-6	xvi n.2
1113a16	338	1145b3-6	134
1113a33ff.	338	1145b20	105
1113b3	335	1145b27	105
1113b3-4	170 n.13	1147a3	343
1113b17	380	1147a21ff.	204
1114a31ff.	380	1147a25ff.	202
1114a32ff.	245	1147a26	204 n.50
1115a6-7	352, 355	1147a26ff.	202
1115a15	253	1147a26-27	204
1116b24-26	336	1147a28	345
1117a29	352, 355	1147a29-31	203
IV: 1127a23ff.	210	1147a31	202, 204 n.50
V: 235; V.7:212		1147a32-34	203
1129a16-17	343	1147b3-5	193, 201
1130a11	234	1147b4ff.	245
1130a12	235	1147b4-5	262 n.64
1134a35ff.	212	1149a25-32	336
1134b27-30	212	1150b28	262 n.64
1137b13ff.	213	1151a16-17	181
1137b17-19	214	1151b11-12	335
1137b29	214	1153b27ff.	134
1137b30	214	VIII: 1155a22	213
VI: 170 n.13		1159a5ff.	104
1139a20	341	IX: IX.4: 217	
1139a23	337	1166a13ff.	217
1139a31	337	1166a19ff.	104
1139b4-5	337	1166a23ff.	217
1140a2	347	1170a8-10	215

INDEX LOCORUM

X: 102, 106 n.8, 170 n.12	1286a6ff.	212
1172b36-1173a1	1286a23-24	213
1174a29ff.	IV: 1294a17-19	334
1177b6	VI: 1322a32	262 n.64
<i>Magna Moralia</i>	VII: 1323b33-36	333
1183b20ff.	1326a26	262 n.64
1189a31	1328b38	346
1200b16	1329b25ff.	134 n.43
1201b13	1332a26ff.	171 n.13
<i>Eudemian Ethics</i>	1334b20ff.	335
100 n.1, 175, 182, 278	<i>Rhetoric</i>	
I: 1216b26	248 n.44	
1216b26ff.	I: 1.10: 379	
II: 182, 191; II.8: 380; II.11: 181, 183 n.29	1354b3ff.	212
1221a30	1354b8ff.	212
1222b23	1369a2-4	338
1223a26-27	1369a4	336
1223a34	1369b2-3	335
1225b25	1369b15	335
1225b26	1369b18	338
1225b32ff.	1370a17	335
1226b10ff.	1370a28	248 n.44
1226b17	1370b32	248 n.44, 265
1227a7ff.	1371a19	248 n.44
1227b21ff.	1371b9	184 n.32
1227b30	II: 1383a16-17	352, 355
III: 1233a31	III: 1404a11	254
V: V.7: 379	1417a23	304
1235b22	<i>Poetics</i>	
1235b25-29	1448b16	184 n.32
1235b26	<i>Anatamai</i>	
<i>Politics</i>	4-5, 10	
I: 1254a5	<i>Fragmenta</i>	
1256	<i>De Philosophia</i>	
1256b11-22	12a (Ross)	95 n.48
II: 1262a25-30	13	95 n.48
1262b29	17	95 n.48
III: III.12: 217	24	381
1281a40-b21	Pseudo-Aristotle	
1282a15	<i>De Mundo</i>	
1283a3ff.	290	
1284a35	392a5	317
	394b31	288

INDEX LOCORUM

398b13ff.	347 n.5	III.10	290
<i>De Spiritu</i>		587,24ff.	6 n.15
3, 7, 375		591,22	6 n.15
481a1-2	7, 375	591,30-34	290
483b24	10	Simplicius	
<i>De Ventis</i>		<i>In Ph.</i>	
290		3,6ff.	6 n.15
973b17-21	288	923,7	5 n.10
Commentaria		<i>In DC</i>	
Alexander Aphrodisiensis		7,1-2	109
<i>In Meteor.</i>		398,18ff.	6 n.15
3,34-4,6	6 n.15	<i>In DA</i>	
6	6 n.15	116,16	375
421,10	301	303,22	273
<i>In DA</i>		303,22ff.	6 n.15
97,26	6 n.15	Themistius	
97,26-27	273	<i>In DC</i>	
Averroes		97,16	273
<i>Comm. Magn. in DA</i>		97,20	6 n.15
524 (Crawford) 5 n.14		<i>In DA</i>	
Michael Ephesius		121,1-18	6 n.15
<i>In MA</i>		Plato	
106,11ff.	289	<i>Charmides</i>	
106,27-28	289	160d	184 n.32
109,9ff.	308	<i>Gorgias</i>	
109,22-24	311	450b7	218 n.61
110,13	317	479c	184 n.32
112,3ff.	319	498e	184 n.32
112,12-14	323	<i>Hippias Major</i>	
113,3ff.	327	300c	244
113,11	330	<i>Laws</i>	
116,16-23	185 n.33	644b	347 n.5
118,30-33	348	799a	184 n.32
120,21ff.	361	886a	95 n.48
126,15-25	373	<i>Parmenides</i>	
127,16-17	375	166a4	242
128,20ff.	383	166b6-7	242
Philoponus		<i>Phaedo</i>	
<i>In Ph.</i>		81d	244
2,7	6 n.15	97b-98b	95 n.48
<i>In Meteor.</i>		99c	304
9,15	6 n.15	<i>Philebus</i>	
<i>In DA</i>		34a-b	244

INDEX LOCORUM

38c12	243, 243 n.38	Anaxagoras	
51a	244	DK A 1 (9)	299
<i>Protagoras</i>		DK A 42 (10)	299
356d-e	165, 174	Aristophanes	
<i>Republic</i>		Schol. <i>Birds</i>	179 303
I: 81, 88		Aristophanes of Byzantium	
352e-353a	81	Epit. HA	4 n.8
380d	244	Critias	
382e	244	DK 88 B18	303
514b	347 n.5	Democritus	
529c7ff.	283	DK B 9	66 n.10
596e	242	DK B 155	348
598a-b	242	Diogenes Laertius	
599a	242	17	xvii
601b	242	Euripides	
<i>Sophist</i>		<i>Hec.</i> 54	244
235d6ff.	242	94	244
236b4ff.	243	390	244
242c8	302	<i>Peirithoos</i>	303
264b	242 n.36	Galen	
266	244	<i>Histor. Philos.</i> 71	
<i>Symposium</i>			314
210e4	243 n. 38	<i>De Usu</i> 48	347 n.5
211a5ff.	243, 243 n.38	262	347 n.5
<i>Theaetetus</i>		<i>Med. Gr.</i> (Kühn)	
152b-c	242	18 (1) 462	348 n.6
153c	321	Herodotus	
<i>Timaeus</i>		2.148	184 n.32
97 n.53, 301		4.124	244
40b-c	303	7.10.5	254
91b	384	7.189	289
Other Ancient Authors		Heron Alexandrinus	
Aeschylus		<i>Automatopoietica</i>	
<i>Ag.</i> 215-17	209		347 n.5
221	210	Hesiod	
1500	244	<i>Tb.</i> 517ff.	300
<i>Septem</i> 710	244	746ff.	300
fr. 312	244	Hippocrates	
<i>Prom.</i> 428-30	302	<i>Aphor.</i> 6.30	355
Aetius		<i>On Anc. Med.</i>	
<i>Plac.</i> II.30	314	I.2-3	354
Agathemerus		Hippolytus	
217	288	A 42	299

INDEX LOCORUM

Homer		Plutarch	
Il.	98	<i>Epit.</i> II.30.1	314
VIII.20-22	320	Speusippus	
XII	71	fr. 41	298
XII.299-306	59	Stobaeus	
XVII.339	321	<i>Ecl.</i> I.21.1	314
<i>Od.</i> I.53-54	300	Tacitus	
V.296	290	<i>Hist.</i> III.51	173
XL576-79	289	Theophrastus	
Lucian		<i>Metaph.</i> 11 A23-25	
<i>Timon</i> 54	289		298
Lysias		Thucydides	
32.22	184 n.32	2.64.3	286
Olympiodorus		Vergil	
<i>In Pl. Gorg.</i>		<i>Aen.</i> IV.482=VI.797	
41.3	xvii n.5		302
Pindar		<i>Vita Marciana</i>	
<i>Pyth.</i> 4.289	303	5	xvi

Library of Congress Cataloging in Publication Data

Aristotles.

Aristotle's De motu animalium.

Bibliography: p.

Includes index.

1. Zoology—Pre-Linnaean works. 2. Animal locomotion. I. Nussbaum, Martha Craven, 1947-
II. Title. III. Title: De motu animalium.

QL41.A724 1978 591.1'852 77-72132

ISBN 0-691-07224-8

ISBN 0-691-02035-3 (pb.)